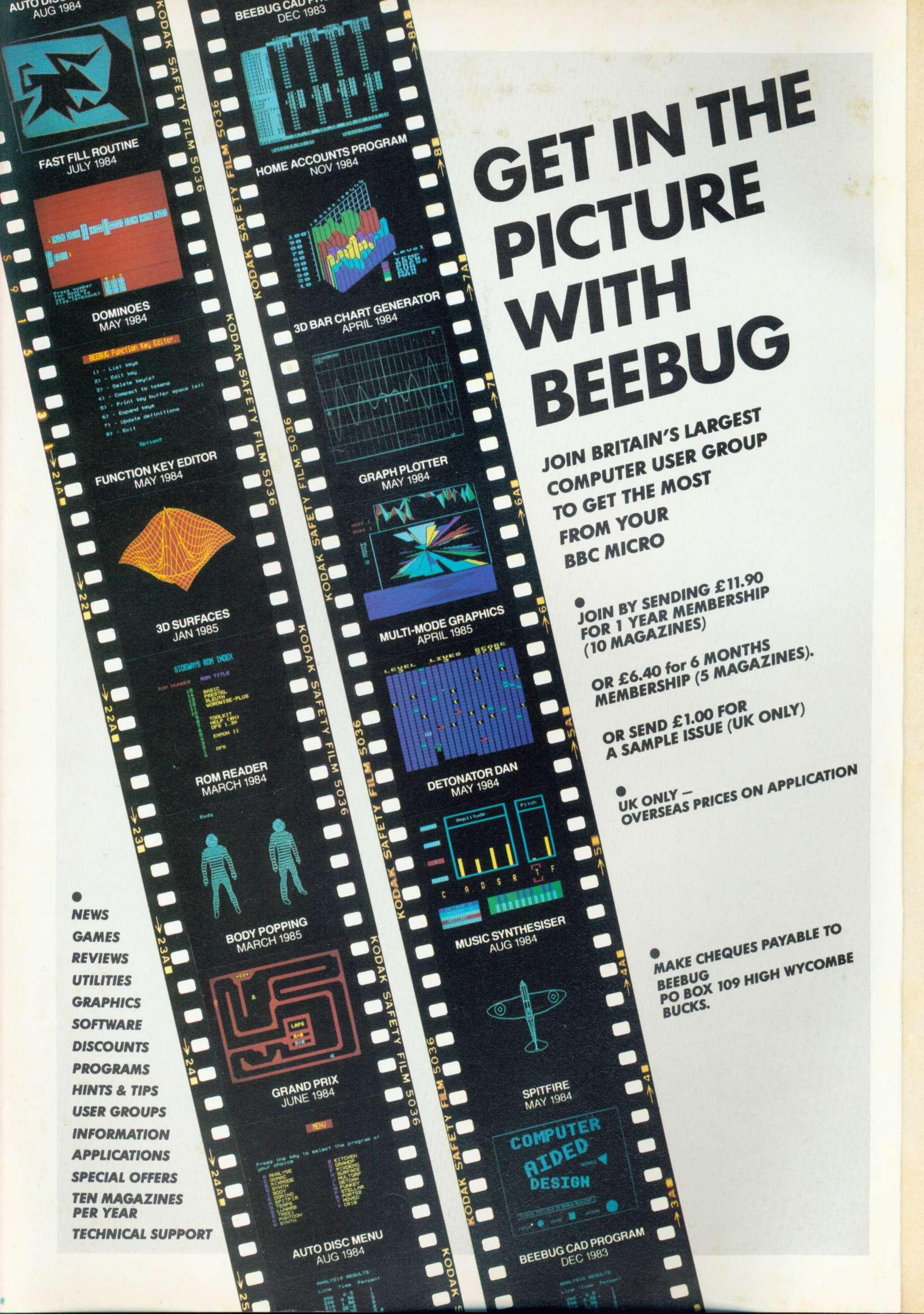


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SEPTEMBER 1985
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APRIL 1984
FUNCTION KEY EDITOR
MAY 1984
GRAPH PLOTTER
MAY 1984
3D SURFACES
JAN 1985
MULTI-MODE GRAPHICS
APRIL 1985
ROM READER
MARCH 1984
DETONATOR DAN
MAY 1984
BODY POPPING
MARCH 1985
MUSIC SYNTHESISER
AUG 1984
GRAND PRIX
JUNE 1984
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FEATURES

ATOM

YELLOW PAGES

The major listings for this issue are printed in the yellow section starting on page 97. These are also available on cassette (which includes a tape-to-disc transfer routine and index program) and in bar code format to save you typing them in. Details of how to order these on pages 96 and 102



Micronet members look out for free *Acorn User* programs.

REVIEWS

REGULARS

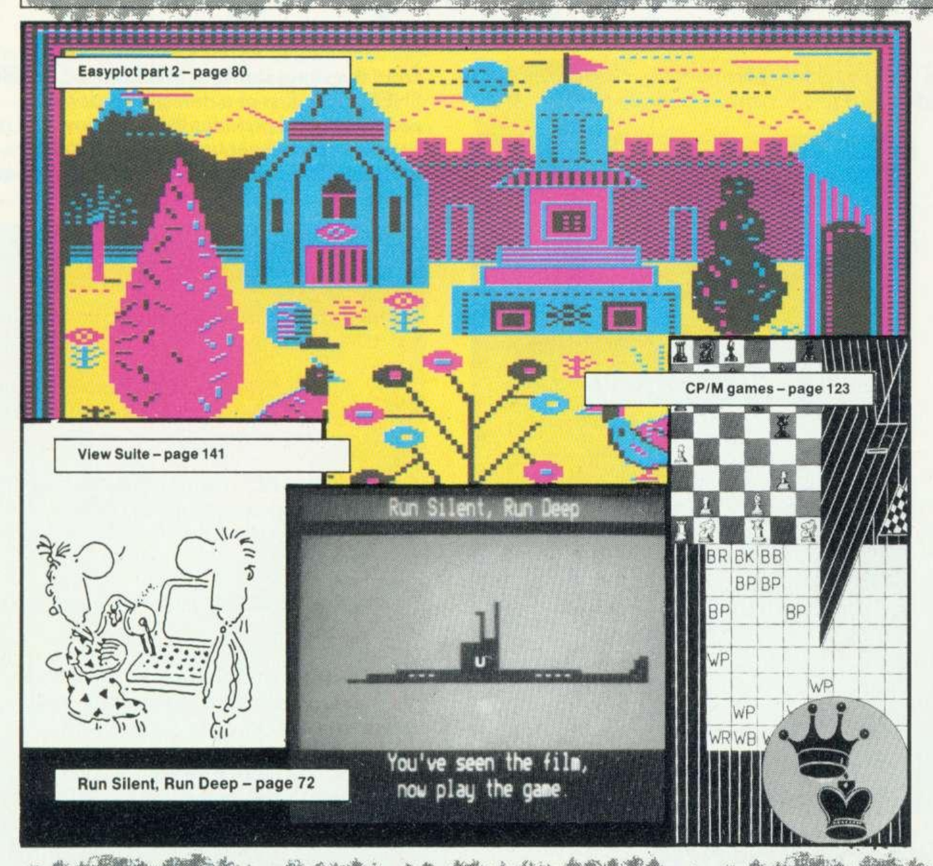


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WORDPROCESSING SPECIAL/SEPTEMBER



NEXT MONTH

COMPUTER GRAPHICS SPECIAL

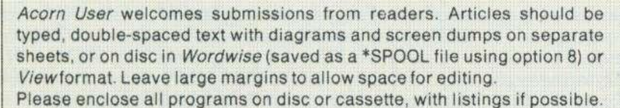
- A graphics pack for artists
- Fractal generator
- Pretty patterns from motifs
- Introduction to networking

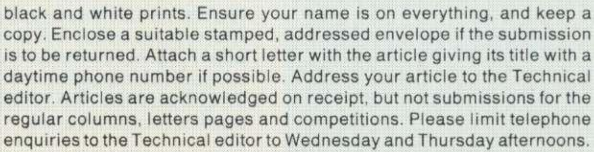


Acorn User
September 1985
Issue number 38

Cover photograph by
Gary Bryan

Notes for authors


Acorn User welcomes submissions from readers. Articles should be typed, double-spaced text with diagrams and screen dumps on separate sheets, or on disc in *Wordwise* (saved as a *SPOOL file using option 8) or *View* format. Leave large margins to allow space for editing.
Please enclose all programs on disc or cassette, with listings if possible. Also follow the style used in presenting listings in the yellow pages section. Photos should be 35mm, or larger, transparencies, or 5in by 7in


black and white prints. Ensure your name is on everything, and keep a copy. Enclose a suitable stamped, addressed envelope if the submission is to be returned. Attach a short letter with the article giving its title with a daytime phone number if possible. Address your article to the Technical editor. Articles are acknowledged on receipt, but not submissions for the regular columns, letters pages and competitions. Please limit telephone enquiries to the Technical editor to Wednesday and Thursday afternoons.



INTER-SHEET

The electronic spreadsheet program

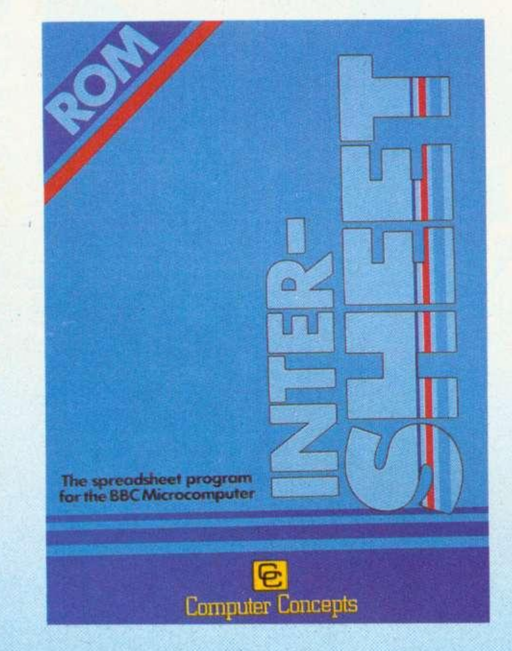
Spreadsheet programs have become powerful and very popular applications for micro-computers, second only to word processors. They can be regarded as a totally general purpose tool.

INTER-SHEET supports a full range of high precision mathematical functions, and a variety of special sheet functions, such as SUM, MAX, MIN, LOOKUP, AVERAGE etc.

Numbers may be printed in three different formats, and with up to nine decimal places. Labels may be left, centre or right justified. All the box formats are alterable on a box by box basis.

INTER-SHEET is supplied on two ROMs. If there is only one socket spare, then it is still possible to access most of the features of INTER-SHEET. The facilities lost are mostly to do with the ROM-LINK integration and multiple spreadsheets.

The INTER-SHEET ROMs are not designed to work with the 2nd processor. However a HI-INTER- SHEET is available on disc that allows 42K of storage on the 2nd 6502 processor. This program requires that one INTER-SHEET ROM is present in the BBC micro, and is supplied at £4.95.



From the same stable as WORDWISE, INTER-SHEET is the first of a new generation of programs, and provides the most powerful and flexible spreadsheet on the market for this machine. This package has many quite unique features–

1 Up to 16 spreadsheets in memory at the same time.

2 Data from one spreadsheet can be used directly by others.

3 Compact, tokenised data storage means that larger than normal spreadsheets can be supported.

4 40, 80 or 105 column screen modes. The special 105 column mode allows a far greater proportion of the spreadsheet to be seen on screen.

5 Fast re-calculation and replication times (see table).

6 Complete documentation—an introduction manual, reference manual and quick reference card.

7 Data can be transfered to and from popular word-processors like WORDWISE and VIEW.

8 Extensive built-in help menus.

9 Will integrate directly with INTER-CHART and other ROM-LINK compatible products.

10 Simple to use self prompting commands.

The above points are unique to INTER-SHEET. The last unique feature is the price, lower than any other ROM based spreadsheet.

£49.00+VAT (£56.35)

Spreadsheet comparisons

Times in seconds	VIEW-SHEET	ULTRA-CALC 2	INTER-SHEET
Replicate SIN(PI) into boxes A1 to Z50	66	65	7
Recalculate the above	28	33	5
Number of bytes free with above sheet	4664	1415	8400
Price (Exclusive of VAT)	£52.00	£69.13	£49.00

ROM-LINK

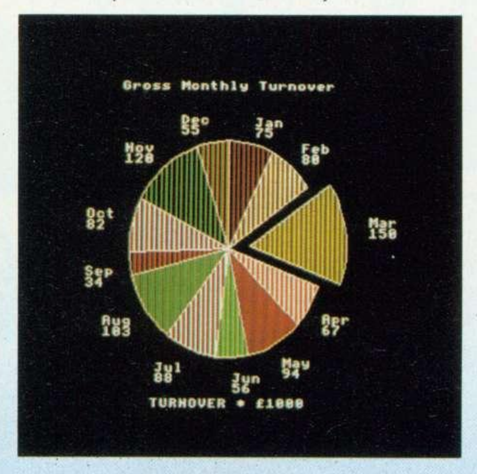
The ROM-LINK concept provides a system that allows true integration on the BBC machine. The system takes full advantage of the BBC micro's ability to switch between ROMs and allows direct communication between a variety of different programs. Any ROM-LINK compatible program will integrate directly with any other ROM-LINK program. INTER-SHEET and INTER-CHART are the first in a planned range of ROM-LINK compatible application packages.

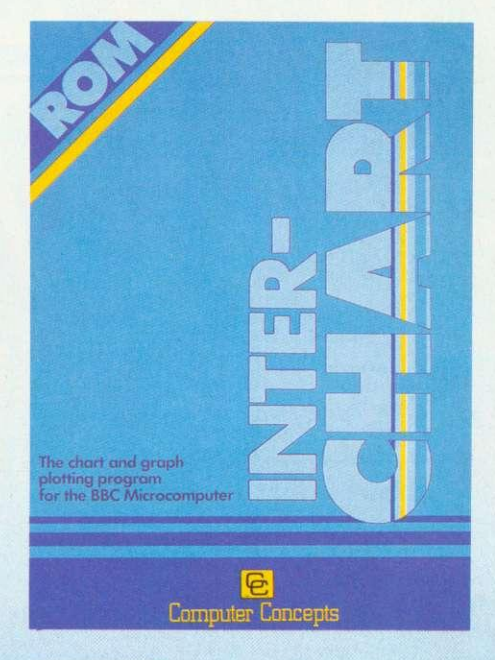
ROM-LINK has two great advantages. Firstly it allows multiple packages (up to 16) to occupy the machine at the same time, so when switching from one task to another there is

INTER-CHART

The chart and graph plotting program

The perfect partner for INTER-SHEET, allowing data to be displayed in a variety of graph formats. Strings of numbers are usually difficult to digest, and it is almost impossible to find any trends in data when displayed numerically. However when displayed graphically even the most complex data can be easily studied.







INTER-CHART has screen dump facilities for EPSON compatible printers although other printers can be catered for.

Supplied with a full manual and fitting instructions.

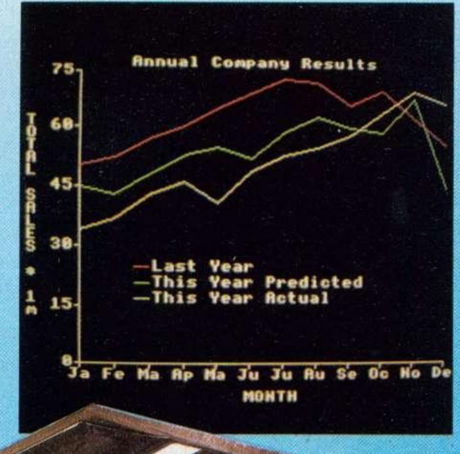
INTER-CHART can accept data from three quite distinct sources. Firstly, directly from other ROM-LINK packages such as INTER-SHEET. Data can be obtained directly from any box, row, column or area of the spreadsheet.

Secondly, data can be entered at the keyboard. At the simplest level the user can type in a series of numbers, and a graph will be plotted from that data.

Thirdly, data can be read from ASCII files on disc or tape. This enables data to be used from other languages or programs or from practically any source that can store the data onto file in the first place.

INTER-CHART supports three main types of graph. The pie chart, the line graph and the bar chart. In the pie and bar chart any particular element of data can be highlighted.

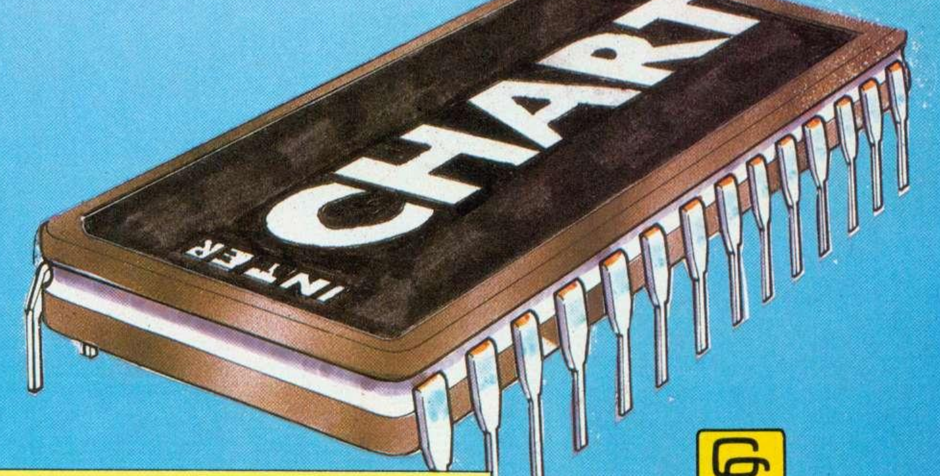
Up to 16 separate sets of data (graphs) can be held in INTER-CHART, but because this product is ROM-LINK compatible up to 16 separate INTER-CHARTs can be on the go at once. Many graphs can be overlayed on top of each other (not pie charts) so comparisons can be made between separate sets of data.



£32.00+VAT (£36.80)

Available from all good software dealers or directly from ourselves at the address below.





no need to save the data before entering the next package. Secondly it provides a means of directly transferring data from program to program.

The system works even if only one ROM-LINK package is present in the machine, for example INTER-SHEET. In this case up to 16 separate spreadsheets may be held in memory and any spreadsheet can use the data from any other.

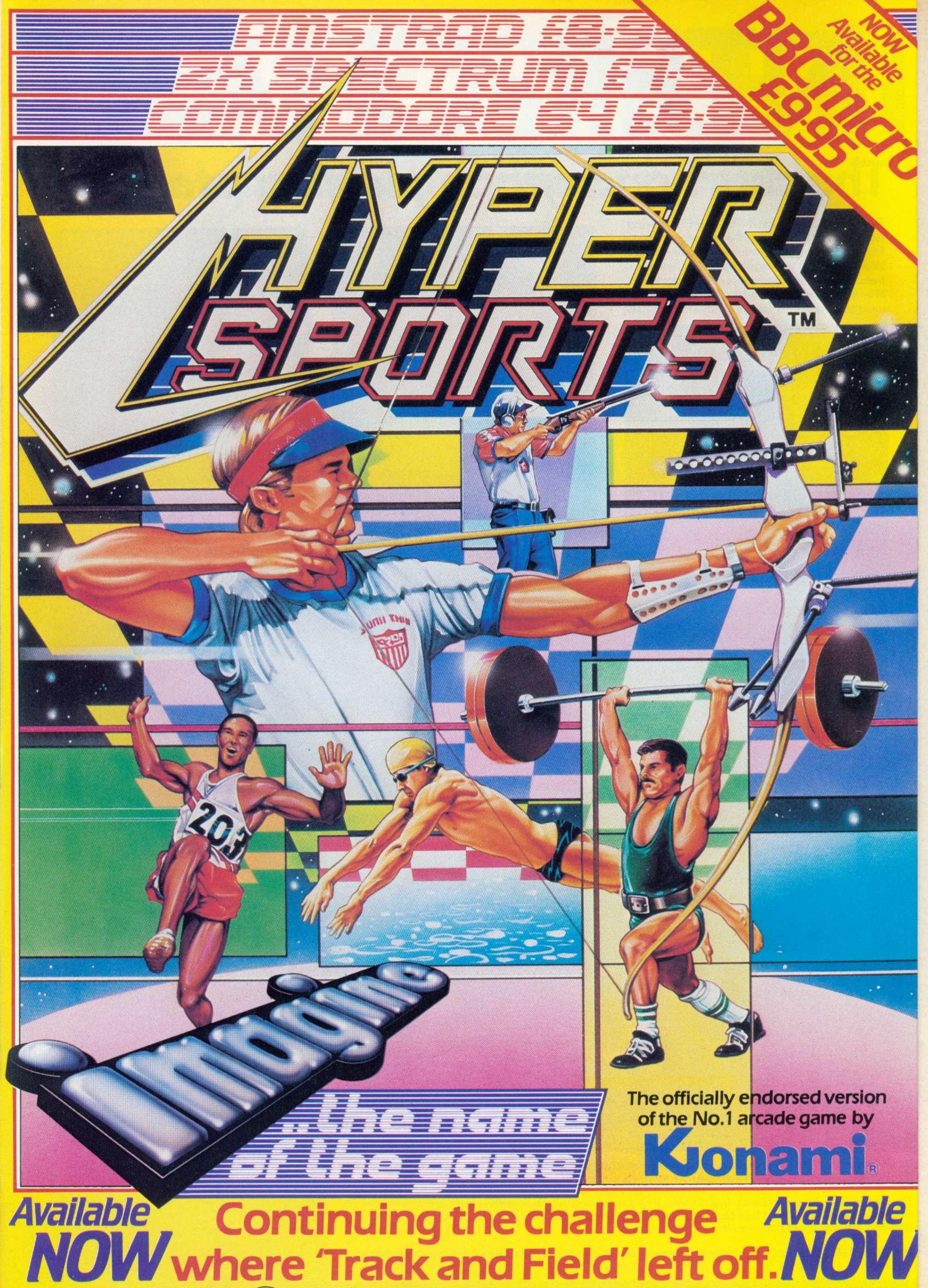
The ROM-LINK concept will provide a degree of integration not found on any other system.

Computer Concepts

Gaddesden Place, Hemel Hempstead, Herts. HP2 6EX (0442) 63933







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New government rules may hinder computer exports

SERIOUS export obstacles for Acorn computers and other British hi-tech equipment – including software – have been predicted in Parliament as a result of new government regulations.

According to Liberal MP Paddy Ashdown during a Commons committee hearing, the result could be devastating for future export hopes.

The controls are the result of American government demands, intended to prevent the export from the West to the Eastern bloc of militarily sensitive technology.

But the real result, claims Mr Ashdown, will be to place export licence controls over virtually all technology relating to computers sent anywhere out of the country.

This means he says, that even computers such as a Sinclair Spectrum now require export licences from the Department of Trade.

Even large areas of software would now need licences for export to EEC countries.

Mr Ashdown revealed that at a recent legal seminar a Department of Trade and Industry official conceded that a child swapping computer game software with his Geman pen pal could fall foul of the new Export of Goods (Control) Order 1985. 'The categories laid out in the order exempt almost nothing from one form of licence restriction or another,' he said.

But he believed the regulations would be virtually unworkable. How, Mr Ashdown queried, could the DTI stop people passing software down telephone lines, how could customs officials check what is on a cassette . . . or how could they decide from long strings of indecipherable bar codes, which were licensable and which not?

Dial-a-prospectus

PARENTS of children at Garth Hill Secondary School in Bracknell can dial-in to the school's computer network using their own micros.

The school runs a private viewdata system for parents and pupils. There are plans to put on the school's prospectus and details of adult classes.

The saving of Acorn – Part 2

ACORN has announced a second major refinancing of the company by Olivetti – and the appointment of a new managing director.

Olivetti put its industrial influence into action to force through a financial package with three major elements:

- Major creditors agree to write off half of the money owed them in return for payment of the rest now.
- Olivetti funds Acorn by buying up a further £4 million-worth of shares, reducing the stake of joint founders Hermann Hauser and Chris Curry to less than 15 per cent.
- Increased overdraft from the banks as a result of the reduction of debts.

Olivetti now has control of Acorn with its equity raised from 49 to almost 80 per cent.

Negotiations to sell off Acornsoft have been suspended. Further redundancies look unlikely, said director Alex Reid, leaving a staff of about 270 from a peak of 480.

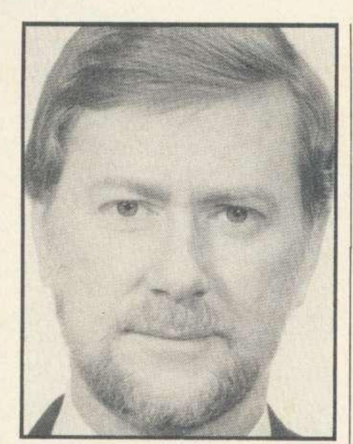
The new managing director is David Brian Long, 41, who was engaged in consultancy work with the de Havilland aircraft company for the Canada Development and Investment Corporation. Before then he was president of Massey-Ferguson Industries, the Canadian machinery group.

He will take over the reins from acting managing director Alex Uboldi.

Two new products – the Communicator and Cambridge Workstation – have been given the thumbs-up by Olivetti. Acorn has great faith in the Communicator, a desktop computer/terminal it hopes to sell to other companies for them to use or market.

Hermann Hauser is set to announce a new project believed to be connected with VLSI chip design using a reduced instruction set.

The launch of the Workstation was delayed as a result of the share suspension, but re-scheduled for July 31.



Canadian Brian Long: takes the helm at Acorn

BBC affirms micro contract

BBC Enterprises has confirmed its support for the BBC micro project and assured the future of the BBC contract with Acorn under Olivetti.

The Enterprises division, which is responsible for all merchandising, has reduced royalties on products carrying the BBC name and written off £2m owed.

John Harrison, deputy sales director, said: 'We are sad (that Acorn has had problems) and we hope they can solve them. Olivetti are good people to have around.'

He added: 'The BBC contract is with Acorn. There have been discussions with Olivetti, and we are establishing a good working relationship.'

On the controversy of whether the IBM-compatible operating system MS-DOS should become a standard for schools, Harrison said: 'We need to be very aware of what is happening in industry, but we are not convinced that MS-DOS is better.

'The need for an MS-DOS second processor for the BBC micro is being actively discussed, but will it be important in six months' time? Computing is full of seven-day wonders.'

MUD 'fight to the death'

MUD (Multi-User Dungeon) is officially launched this month and in October's issue of *Acorn User* readers have a chance to win a night out in the London Dungeon and free tuition from an Arch Wizard.

MUD is an interactive text-only adventure game which runs on a British Telecom mainframe and is accessed over the phone lines. Up to 100 players can play simultaneously and influence the actions of other players.

The first AU reader to open the tomb in the game's mausoleum will be invited to a MUD Spectacular at the London Dungeon on November 5, where he or she will play against winners from other magazines in a 'fight to the death'. The outright winner gets £1,000 and free time on the system.

It costs £20 to join MUD and £2 per hour in time charges. Further details from the MUD-line on 01-608 1173.

Solidisk rapped

SOLIDISK Technology has come to the attention of the Advertising Standards Authority with three complaints partly upheld and two upheld.

Most related to product availability, and the ASA expressed concern that items were advertised when not in stock, and that enquiries were not properly dealt with.

Only Sinclair Vehicles comes out worse in the ASA's Case Report 123 with 17 objections, mainly about safety claims.

```
MICRONET 800 (C)          ROMS1          0p
  Acorn abusing                    13:06:85

Leading ROM publishers including Comp-
uter Concepts and Watford are accusing
Acorn User magazine of encouraging
software piracy, following its decision
to market its own sideways RAM board.

Watford Electronic's boss, Nazir Jessa,
told the Net: "It's inviting official
piracy". He stressed that it's not the
actual board that's the problem -
Watford in fact produce their own side-
ways RAM - but the fact that Acorn User
is producing it.

Computer Concepts' Managing Director,
Charles Small, said "There are other..
                                more...#
  GOTO 1 Next story      8 Newsflashes
  GOTO 2 News Index      9 A - Z Index
```

```
MICRONET 800 (C)          ROMS2          0p
  Acorn abusing                    13:06:85
  Acorn abusing                    13:06:85

   You've read the review, you've
   played the game...NOW...GOTO 5
   to win the game.

.. boards available, but this one has
the official backing of Acorn User."

Adrian Calcraft, software manager at
Beebugsoft, said: "It's not a very good
idea - our ROMs are protected so they
don't work in sideways RAM."

But Tony Quinn, Editor of....  more...#
  GOTO 1 Next story      8 Newsflashes
  GOTO 2 News Index      9 A - Z Index
```

The first two frames from the offending Micronet story. Frame 1, first paragraph gives the offending phrase: '. . . are accusing Acorn User magazine of encouraging software piracy . . .'. The companies quoted have all denied making such an attack

Acorn User hits back over piracy accusation

ACORN USER has reacted angrily to accusations on Micronet of encouraging software piracy by backing a 16k sideways RAM product called UserRAM.

The story claimed that at least three ROM publishers had made the accusation (see above); but all the companies have denied this.

However, Micronet editor David Babsky defended the story: 'In their conversations with us, Computer Concepts, Watford Electronics and Beebugsoft accused *Acorn User* of encouraging software piracy.'

Tony Quinn, editor of *Acorn User* said: 'I've spoken to all parties and all have denied making such an accusation. They repeated their concern about the possibilities of such a board being used for piracy, but that exists for all hardware and software, from disc drives to machine code monitors.'

Charles Moir of Computer Concepts said: 'There's no way I would have said that. The board is open to use by pirates, but exactly the same can be said of *Disc Doctor*.'

Nazir Jessa of Watford felt the whole issue has blown up out of all proportion, and confirmed his comments had been misinterpreted.

Lee Calcraft of Beebugsoft explained he had talked to Micronet, but on hearing that his name had been used in the accusation, asked for it to be removed. 'I had no intention of saying *Acorn User* was encouraging software piracy.'

Quinn said the original story was full of inaccuracies and the quotes used from the software companies did not back up the contentious opening paragraph.

He explained: 'The accusation is only made by one person. How a reporter can interpret the statement "There are other boards available . . . but this one has the official backing of *Acorn User*" as accusing us of encouraging piracy is beyond me.'

Acorn User wrote to firmware publishers in May asking them for details of licensing for schools and businesses and about the possibility of releasing ROM software on disc for sideways RAM users. First to reply was Dave Clare: 'We already supply our utility ROM *Brom* on disc . . . We will of course be willing to consider additional discounts to educational establishments . . . I see no reason for any problems.'

Both the BBC and Acornsoft have responded favourably, but have yet to make an official statement.

Twice bitten, but still keen

SNAKES and reptiles are the stock in trade of Mark O'Shea, who's been using a BBC micro to identify them as part of the Operation Raleigh expedition to the Honduras.

Our picture shows Mark holding a pair of Thunder-and-Lightning snakes, which although non-poisonous still managed to deliver two nasty bites to his right arm.

Mark, a postgraduate herpetologist, is now back in this country but hopes to go to Papua New Guinea next year, and actually take BBC micros out into the field to assist with identification.

Previously they have been confined to the Operation's flagship, the Sir Walter Raleigh, but purpose-built 'jungle boxes' will keep the Beebs protected from the damp and the bugs.

Meanwhile, the Sir Walter Raleigh sails on to Peru and Chile. In Peru young people will be using BBC micros to survey the Tambopata wildlife reserve, near Cuzco, and in Chile others will be carrying out vegetation mapping with COMAF, the Chilean forestry body.



Mark O'Shea, struck by Thunder-and-Lightning snakes

When fiction becomes fact

EDITORIAL

SIDEWAYS RAM is one of the most useful techniques on the BBC micro. It takes the sideways ROM concept beyond the limitations of the number of chip sockets. Swapping discs is a lot easier than swapping chips.

***Acorn User* has carried articles on sideways RAM boards since May. However, we are not in the business of promoting software piracy – with this technology or any other. The 16k UserRAM was released as a result of demand, initially from schools, for a product that was easy to fit, had good software, and was well supported. It is aimed at schools and others who do not want to play around inside their micros.**

***Acorn User* wrote to ROM producers asking them whether they had a licensing scheme for network users and then whether they had any plans to release ROM software on disc for sideways RAM users.**

We respect the views of software companies and their legitimate concern over piracy. We defend their right to say 'No' to supporting sideways RAM users. They have nothing to fear from this magazine. We value their expertise and products far too highly.

What we will react to are smears against the reputation of *Acorn User* built up over the last three years. We hope readers will support us in this.

In trying to address an issue in a responsible way for the benefit of our readers and the industry as a whole, we have been accused of 'encouraging software piracy'. That statement made on Micronet is inaccurate and is totally refuted by this magazine.

Micronet is wide open to anyone with a grudge, an axe to grind, or who just wants to indulge in gossip. That's fine if it's labelled as such, but when it's blown up and treated as an accurate, factual news report, that's a different matter.

Grow up Micronet and live up to your responsibilities. Cast aside the cowboy image. Rather than sensationalise and throw up smoke screens, address the real issues.

News in brief

☐SPIDER is a hardware add-on for the Beeb which allows control of real-time events from Basic. The unit can handle digital and analogue I/O signals, and it has process timers which are independent of the main program flow.

The Spider board combines sideways RAM with ROM-based software and plugs into the User VIA socket.

The Spider costs £65 and uses the printer and user ports. A de-luxe version at £115 uses the 1MHz bus. Details from Paul Fray, Willowcroft, Histon Road, Cambridge CB4 3JD.

☐LSL LOGO is now available for BBC micro Econet systems. The licence fee is £40 per network, and the minimum package of disc software plus four manuals costs £100.

The software is claimed to be fully compatible with Econet 3.6 and 6502 second processor systems; older 3.34 systems need upgrading. Each Beeb also needs 16k of sideways RAM to use LSL Logo over the network.

Logo Software, 316a Richmond Road, Twickenham, Middlesex TW1 2PD.

☐PRACTICALC II is a spreadsheet program for the Beeb which also has wordprocessing and database capabilities.

The software costs £69.95, and complete compatibility is claimed with the 6502 second processor and shadow RAM boards. Details from Practicorp Ltd on (0473) 462721.

☐STOCKCHECK teaches secondary school students the rudiments of stock control. The package costs £19.50 (£27.50 for colleges of further education) and works on a BBC micro with an Epson or Canon printer.

Stocksystem is a more advanced version, priced at £33.50. It can print serially numbered purchase orders and goods received notes, sort by supplier, and value stock using the moving average cost method. Details from R Reeves, 24 Carthona Drive, Fleet, Hants GU13 9SF.

☐ENTHAR Seven is an adventure game on two discs for the BBC micro. It has a science fiction setting and over 450 locations.

Enthar Seven costs £17.95 from Robico Software, 3 Fairland Close, Llantrisant, Mid Glamorgan CF7 8QH.



Sir Clive and Jane meet for the first time on July 4 in the Mirror's strip

Sir Clive stars as cartoon cupid

SIR Clive Sinclair must be wondering what he let himself in for. After Robert Maxwell's buy-out of Sinclair Research, Uncle Clive now finds himself portrayed as a cartoon character in the *Mirror* newspaper – also owned by Maxwell.

In the Jane cartoon strip, Uncle Clive is seen helping girl-about-town Jane find her ideal partner using computer dating, while he simultaneously explains the innermost workings of the micro.

As *Mirror* readers will know, Jane succeeds in losing most of her clothes at the earliest opportunity but Uncle Clive manages to resist her charms throughout.

This little piece of nonsense was commissioned by the *Mirror* ten weeks before Robert Maxwell's well-publicised rescue of Sinclair Research and, according to a *Mirror* spokesman, its appearance in the paper at the same time as the take-over announcement was 'pure coincidence'.

There are no plans for Jane to visit Acorn.

£13m pledge for school computing

MONTHS of uncertainty over the future funding of classroom computer education has been ended with promises of more than £13 million of government cash over the coming years.

Most of the money will be for training the trainers, developing curriculum material and providing a central source of information for education authorities. It will also allow the creation of a new body – the Microelectronics Support Unit – to provide advice and information for local education authorities in England, Wales and Northern Ireland.

In addition some £3½ million has been earmarked specifically for schools to buy more educational software.

Confirmation that there will be life after the death of the Microelectronics Education Programme (MEP) next March was given by Education Secretary Sir Keith Joseph just before Parliament rose for its long summer recess.

Whitehall reckons that the MEP, launched in 1980, has proved a major success, putting micros – the vast majority of them Acorn BBCs – into virtually every secondary and primary school.

The government has committed £2.2 million a year in England alone for the next five years to support computer education through the MSU.

Meanwhile cash is being made available to local education authorities to help buy educational software. Of the £3½ million promised by the Department of Trade and Industry, £500,000 will be allocated during this financial year, £2 million in 1986-87 and £1 million in 1987-88.

FIF utilities aid data transfer

FILE Interchange Format (FIF) is a set of utilities which allows data to be transferred from one database program to another – and ultimately from one machine to another.

FIF creates two programs for each database – one to convert data from the database into standard FIF format and the other to do the opposite. Once data is in FIF format, it can be converted to run on different databases or sent to other computers.

The FIF standard (which is still provisional) has been developed by the Council for Educational Technology (CET) who are handling enquiries at 3 Devonshire Street, London W1N 2BA.

Compact awaits Acorn's word

COMPACT Software, publisher of the Nucleus program-generator software for the Acorn Z80 second processor, is up in arms about the treatment it is claiming it has received from Acorn.

Compact recently changed ownership and wanted to know if Acorn intended to continue distributing the Nucleus software which comes 'bundled in' with the Z80 add-on.

The company's new managing director, Neville Potter, tried to contact Acorn at the beginning of July but was unable to get a firm commitment from the strike-torn company.

David Bell of Acorn told *AU* that the person who previously dealt with Compact had left and he was taking over. He said: 'Compact's complaint is due to sheer overload of work but it is something which obviously has to be addressed. We intend to continue selling the Z80 and Nucleus software.'

PACE
Micro Technology

NIGHTINGALE – THE MODEM

The Nightingale modem is now established as the most popular multi-baud rate modem in its class. Nightingale lets you get on with the job. Whether you need to extract information from Prestel©, send telexes via Telecom Gold, download telesoftware or simply swap files with a colleague. Did you know that you can search British Library records through their on-line system BLAISE, or access your bank account through homebanking services. The possibilities are endless.

Nightingale operates at the two most popular baud rates, 1200/75 as used by both private and public viewdata systems, and 300/300 baud for communication with remote mainframe, mini or micro systems. Also included is 'reverse viewdata mode', 75/1200 and an optional auto-answer/auto-dial board.

Approved for use in the UK and several other countries, Nightingale can be supplied with quality software for a variety of the most popular micros. If you own or use any micro with a standard RS232 interface, including the BBC micro, IBM PC, Apricot, Sirius or an Apple //e, //c or Macintosh, etc, then we may be able to help you.

With the increasing number of valuable information systems coming on-line, how much longer can you afford to be incommunicado?

Nightingale modem £119 plus VAT

Payment accepted by Cheque, Access or Visa.

Prestel is registered trademark of British Telecommunications Plc. Pace Micro Technology, a division of Pace Software Supplies Ltd.

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.
S/2592/3/E/500065

For further details contact:

Pace Micro Technology
Juniper View
Allerton Road
Bradford BD15 7AG
Telephone 0274 488211
Telex 51564
International tel. no.
+44 274 4488211

Prestel is a registered trademark of British Telecommunications Plc. Pace Micro Technology, a division of Pace Software Supplies Ltd.



PACE
Micro Technology

THE BBC COMMUNICATIONS COLLECTION

NEWS RELEASE

OBBS Bulletin board software

Now, with OBBS and the Nightingale modem fitted with auto-answer accessory board, you can run your own bulletin board on a BBC micro. The entry level system includes many features normally only found on systems costing ten times as much. Full message searching and XMODEM uploading and downloading of software are provided along with unique colour teletext graphics and text facility. **£21.74 plus VAT**

COMMSTAR Nominated for the 1985 British Microcomputing award, Commstar is an outstanding piece of software. With it's powerful combination of Viewdata and ASCII terminal capabilities, Commstar is probably the only communications software you will ever need.

Developed specially for the BBC in an 8K eprom, Commstar once fitted, is always ready to use. Although it is unusually versatile Commstar is also very easy to use. Full advantage is made of the BBC's function keys and a comprehensive manual describes each of Commstar's features in simple terms. In addition to preprogrammed functions, items such as logon strings and passwords can be placed under the function keys to facilitate automatic access to the vast range of services which are available. When used in conjunction with the Nightingale modem or other multi-standard modems, Commstar opens up a host of possibilities. Did you know that you could access your bank account from your own home or search British Lending Library's records through their on-line system, BLAISE. Accessing Prestel for the latest news or downloading telesoftware from Micronet is just the beginning. . . .

NIGHTINGALE ACCESSORY BOARD This new accessory for Nightingale offers three new facilities on a single card. The auto-dialler now means that you can dial any number without using the telephone. Software designed for use with Commstar will dial a specified number or sequence of numbers once or more until a connection is established, each call being optionally monitored through a loud speaker. Any number of directories can be created and for each telephone number in a directory you may specify a series of attributes which allow Commstar to configure itself automatically for that particular system. Nothing could be easier. Any baud rate may be configured under software control including two new operating speeds 1200 and 600 half duplex which were not previously available. Finally, if you hope to set up your own database or bulletin board, the accessory board includes auto-answering.

Nightingale and accessory board, a complete solution.

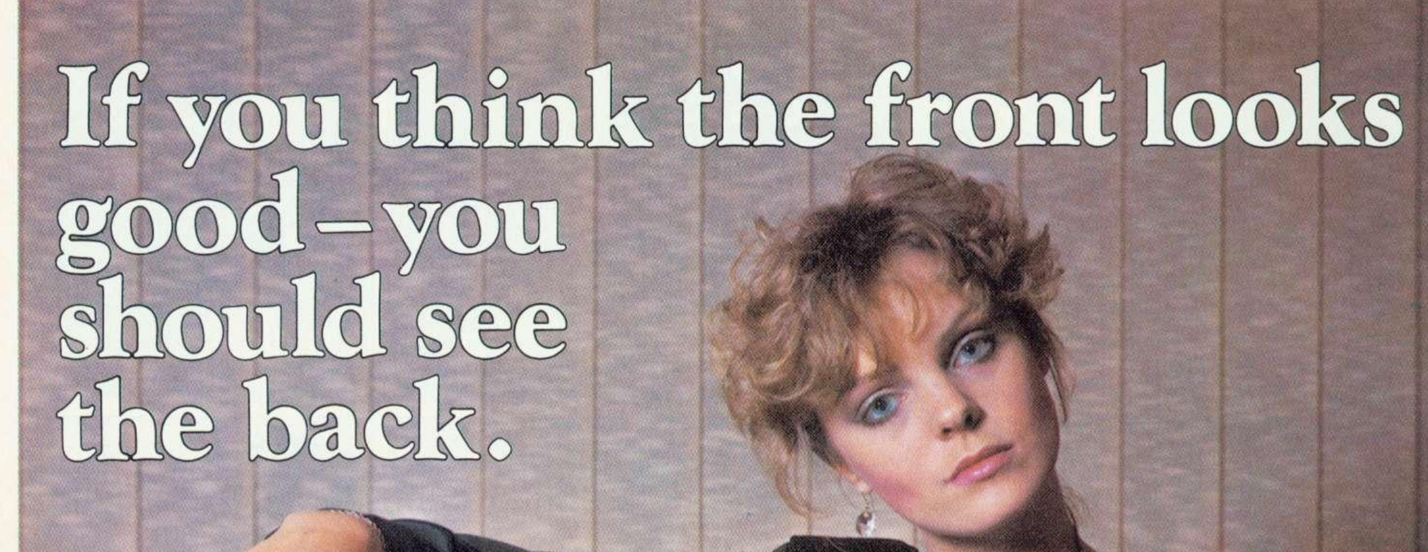
Nightingale modem £119, Accessory board £49, Commstar £29.57,
Commstar dialling software available on disc for £10 plus VAT
Commstar & Nightingale Combination £139

All prices exclude VAT. Payment accepted by Cheque, Visa or Access. 

For further details contact:

Pace Micro Technology
Juniper View
Allerton Road
Bradford BD15 7AG
Telephone 0274 488211
Telex 51564
International tel. no.
+44 274 4488211

Prestel is a registered trademark of British Telecommunications Plc.
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Once again Mushroom has answered a special need of all BBC computer users with their new WORKSTATION — no more untidy wiring, no more pulled plugs, transforms your system into a handsome console unit.

Features include:—

* ADVANCED CABLE MANAGEMENT
* TWIN 400K MITSUBISHI SLIM LINE DRIVES SWITCHABLE FROM 40 TO 80 TRACK WITH STATUS INDICATOR LED'S
* ON BOARD REGULATED 4 AMP POWER SUPPLY WITH OVERLOAD PROTECTION
* MAINS INPUT FILTER FOR CLEAN POWER SUPPLY
* FILTERED POWER TO THE 3 TAKE-OFF SOCKETS AT REAR FOR MICRO, MONITOR AND PRINTER

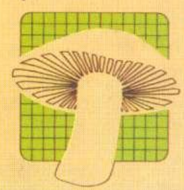
The WORKSTATION is manufactured to the highest safety specifications from lightweight aluminium attractively finished in oatmeal with orange trim. When not in use the computer is stored underneath, affording useful protection from accidental knocks or spillage.



The WORKSTATION, complete with twin disc drives, is suitable for all. Areas of use — Domestic, Schools, Local Authorities, Commercial and Industrial.

This is a must for every user at only £399.00 Exc. VAT.

Those people already owning disc drives can have them fitted into the WORKSTATION. Prices on request.



Mushroom
COMPUTERS LIMITED

Another Mushroom product from Broadway Electronics. Patents pending.

Available direct from:
Broadway Electronics, 55 Tavistock Street, Bedford, MK40 2RF
Telephone: (0234) 58303. Telex: 826112 MUSCOM G, and selected computer dealers nationwide.

Cheapest interactive video claim

BEVAN Technology has produced an interface unit for the BBC micro which turns a video recorder into an interactive video system.

The Good Companion costs £399 and, as well as the necessary electronics to control a video machine – tape or disc – it comes with its own 3½in disc drive.

Text screens can be created, saved to disc and then inserted into video sequences, and the system is fully interactive – pressing various keys causes the video player to jump to different video sequences.



Good Companion: video interface

ROM software to control the unit costs £49.95 and there's a disc-based authoring language, VIPS (£125) to allow the creation and editing of text frames. *Display* is a £49.95 menu-based program for point of sale (POS) applications in shops.

Grenville Bradder of Bevan Technology claims that the Good Companion is the cheapest method of setting up an interactive video system and he sees its main markets as training in schools and industry and POS display.

Further details from Bevan Technology, Gresham Chambers, 14 Lichfield Street, Wolverhampton, West Midlands WV1 1DG.

Teletext adaptor price slashed

ACORN has reduced the price of its teletext adaptor for the BBC micro from £225 to £149 and it will now only be available by mail order – at least provisionally.

The BBC, who insisted on Acorn developing a teletext adaptor for the BBC micro system, considered the adaptor over-priced. A rival teletext receiver produced by Morley Electronics costs just £90.

The revamped Ceefax telesoftware pages will feature a major structured programming course.

The Acorn adaptor is available from Vector Marketing, London Road, Wellingborough, Northants NN8 2RL. Morley is at 1 Morley Place, Shiremoor, Tyneside NE27 0QS.

Echo ROM software



Echo keyboard: new ROM

LVL has brought out ROM software for its Echo music keyboard for the BBC micro.

Echorom gives the Echo keyboard system additional features including faster operation, and the facility to record and play back music on disc or tape.

The software is available from LVL for £29.95. Further details on (0602) 394000.



Tim Lyons: 'Datarama will show listeners how they can use their machines'

Commercial radio to network computer show nationwide

by Geoff Nairn

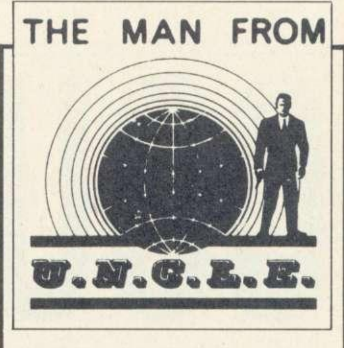
THE first national commercial radio programme for computer buffs takes to the airwaves this autumn. *Datarama* will be broadcast weekly as a series of half-hour programmes by most independent local radio (ILR) stations to an estimated audience of 250,000 listeners.

Radio West has been broadcasting *Datarama* in the Bristol area for the past two years, but starting in September the programme will be going out on at least 30 of the 48 commercial radio stations around the country.

The programmes will include the usual mix of news, gossip and reviews, and will be hosted by a well-known presenter – as yet to be chosen. The show will also transmit telesoftware for a variety of machines, including the Beeb and Electron, which can be recorded onto cassette and loaded into the computer.

Datarama will have commercial sponsors who will have no control over what goes into each programme, according to the Independent Broadcasting Authority (IBA) which regulates commercial radio stations.

With the BBC's own national radio computer show, *Chip Shop*, currently off the air *Datarama* has the field all to itself. But it will be interesting to see if the BBC tries similar spoiler tactics with a new series of *Chip Shop*.



Our regular columnist turns down a full-time job

RESCUE at last (or so it seems). Cap'n Bob has lowered a lifeboat and hauled aboard Uncle Clive – soggy but still defiant. Nice to see a happy ending for once. Mind you, I think the title 'President for life' has an ominous, South American ring to it. I've advised the ginger wizard to employ a full-time food taster (politely declining the job myself) and to start wearing a wig, dark glasses and false beard in daylight hours.

I thought he was being a bit rash when he scorned this suggestion until I saw his most recent purchase – a Colt 45 Magnum. No fly is safe, but those dumdum bullets make an awful mess of the wall. His office looks like downtown Beirut and his secretary operates from behind sandbags. I think the Bouncing Czech will eventually have to use the SAS to get him. Ordinary hit-men from Detroit just won't cut the mustard.

It makes social life a mite unnerving though. There you are, drink in hand, hearing in minute detail about our hero's latest wheeze (compact disc players for the deaf), when somebody steps on a stray Twiglet and the fount of all knowledge drops silently to all fours and disappears behind the settee. All you can see is one beady eye and the barrel of the Colt. Movement is not recommended.

I've only just convinced him that the injudicious use of stun grenades could result in him being declared *persona non grata* on the Cambridge party circuit. Some hostesses are getting a bit sniffy as it is – not surprising if the Red Menace has just blown away their favourite moggy for creeping up behind him.

Still, every cloud has a silver lining. No longer will we have to endure the maniacal stare of Britain's answer to Dale Carnegie (whoever he is) as he tells us on television how to succeed in business while being really trying.

COUNTDOWN TO



The girls of Waldegrove School: in search of the lost shopping precinct

PHOTOGRAPHS BY MIRIAM REIK

NURSERYLANDS shopping precinct in Hampton Hill, West London is not mentioned in William the Conqueror's Domesday Book of 1086; more surprisingly, it is also not to be found on the local authority's planning maps for the area. This was discovered by pupils from the Waldegrove School for Girls when they surveyed the area as part of their contribution to the BBC's Domesday Project – an ambitious rewriting of the original Domesday Book using BBC micros and interactive video disc technology, involving over 13,000 schools around Britain.

Fifty first-year girls from the school, which is in nearby Twickenham, went out in mini-buses one sunny day in July accompanied by three teachers and your intrepid *AU* reporter. The girls had been working on the Domesday Project on and off throughout the summer term, meticulously colouring in large-scale planning maps of the 12 square kilometre area around the school according to land use – residential, industrial, farming, etc. But when it came to the Nurserylands area, the maps showed it as just that – nurserylands. The shopping precinct was only built five years ago and the maps had not been revised; to the girls this was a dramatic illustration of the usefulness of their data, which the BBC will eventually combine with that from all the other schools taking part and put onto a single video disc.

Outside a supermarket in Nurserylands precinct, groups of girls were interviewing shoppers, to work out the 'sphere of influence' of the precinct – how far people travel to shop there and what they come to buy. They also classified the shops there – food, specialist, department store, etc – and entered this information onto sketch maps of the precinct. Back at school the information was typed into BBC micros using the Domesday discs supplied by the BBC. By the end of term the children will have 20 pages of text on disc, plus some 35mm slide photographs to illustrate the area, ready to send to the BBC.

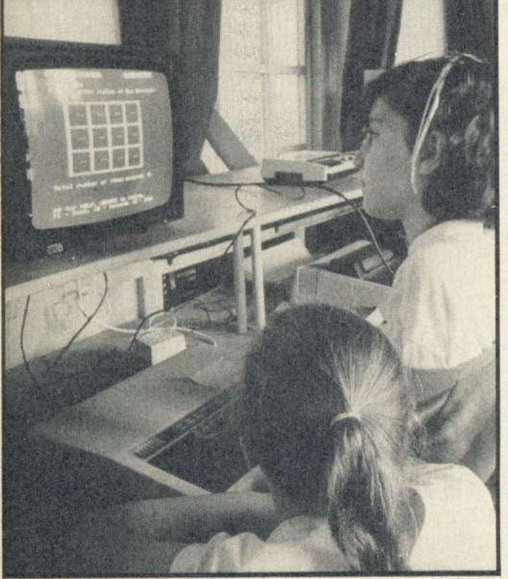
Earlier in the day the girls had been counting vehicles on the Uxbridge Road as part of a traffic survey: this busy road links the M3 and M4 motorways and is the subject of many local complaints. By counting the numbers and types of vehicles using the road at different times during the day, the girls were collecting data which has a real use instead of information for a sterile school project. In fact, the school intends to repeat the survey in subsequent years, to see if there is any reduction in traffic when the M25 orbital motorway is completed.

The Waldegrove School is a secondary school in a predominantly residential suburban area and within its 12 square kilometre Domesday block are nine primary schools. The school gave

DOMESDAY

Geoff Nairn brings you up to date on the BBC's project

each of these a one square kilometre block to map and some of the more interesting surveys: one school was let loose in Hampton Court counting trees, while others conducted social surveys into television viewing habits and fashion. The Waldegrove pupils took what was left and had to be content with surveying a rather boring area composed almost entirely of suburban housing – geography teacher Pauline



Collected data is recorded back in the classroom

Cox was somewhat envious of schools in the wilder parts of Britain.

Nevertheless, the staff at the Waldegrove School were enthusiastic about the Domesday Project and were going to repeat it as a 'stand alone' school project next year. Pauline Cox said: 'It's not just an historical land survey, it's more a contemporary record of Britain in the 1980s'.

The children were equally enthusiastic. Tamsin Honeybourne, aged 12, saw the Project as 'rewriting the Domesday Book', and until that year she had not used a computer – now she goes along to the school's lunchtime computer club. Joanna Severs, also aged 12, hoped that the results of the Project might be used 'to improve the environment'.

Schools such as Waldegrove School are inevitably the ones to benefit most from something like the Domesday Project: they have a physically undemanding area to survey, other schools nearby to share the workload, a well-equipped computer room (12 networked BBC micros plus another 12 elsewhere), enthusiastic staff prepared to put time into preparation, a head willing to reorganise the timetable to fit in field trips, and children interested in the project. In other parts of the country things haven't been quite as easy.

In North Wales, for example, a row broke out when the BBC insisted that all the text entered onto the Domesday discs must be in English, despite the fact that some local education authorities have a bilingual policy – English and Welsh. Charles Davies, Domesday co-ordinator for Clwyd, insisted that Welsh should be allowed. He said: 'There's no way you can ask children whose first language is Welsh to write about their local area in a foreign language.'

The original Domesday Book only covered England and it must have been tempting for the BBC to exclude the Welsh once again, but the BBC compromised and allowed each Welsh school 10 pages in Welsh and 10 pages of English translation. To some this still smacks of discrimination, for English schools are allowed 20 pages of text in their native language, and consequently a few Welsh schools are boycotting the Project. Charles Davies also criticised the BBC for not providing large-scale maps of the Domesday blocks, as some schools were unable to get local authority planning maps.

Ysgol Penbarras is a Welsh-speaking primary school with 82 children in Ruthin, Clwyd – all but a couple of the seven schools in the Ruthin area teach in Welsh. The school's headmaster, Alun Edwards, also thought the BBC's decision on Welsh pages rather unfair, but his main criticism was about the 12 square kilometre block his school had been given. For 11 out of the 12 square kilometres – the ones which didn't include the town of Ruthin – his pupils had not been able to mark down even one of the 67 amenities mentioned in the Domesday Project amenity check list (shops, factories, schools, etc). Mr Edwards felt that the Domesday survey was biased in favour of urban areas, and sparsely populated rural areas such as that around Ruthin 'scored' badly. For the village of Llanbedr Dyffryn Clwyd, for example, his pupils could only record a pub and a post office.

Another problem the school faced was trying to identify the border of its Domesday block when out in the fields, and Alun Edwards would have liked to have had until Christmas to collect the data, because visiting the countryside in a mini-bus was proving very time-consuming. Overall, however, he thought the project worthwhile – the pupils had learnt about different sorts of land cover and had realised just how good the dairy farming land was in their area.

Meanwhile in Scotland the Fife region boasted it had completed all its Domesday surveys by the end of June. Jim Birney, Curriculum Development Officer for Fife, attributed this enthusiasm to the variety of the area. He said 'The children were stimulated to find out about their environment. We've got everything; urban deprivation, new electronics industries, coal mines in the west, hill sheep-farming in the east and fishing on the coast. Fieldwork is quite common with schools in the region and the Domesday Project fits in well.'

The Benarty primary school visited the Lochore area of central Fife which consists of derelict open cast mines and was recently turned into a country park. Another school toured the Fortronics electronics factory as part of its Domesday survey – and came away with free samples.

Further north, in the Grampian region, some schools have been handicapped by their LEA's decision to plump for Sinclair Spectrum computers – the Domesday Project does not support these. To produce their Domesday pages they have had to borrow BBC micros from other schools.

It's too early to say just how successful the Domesday Project has been, and a lot depends on how comprehensive the coverage proves to be: in sparsely populated Northumberland, for example, coverage is quite patchy. Inevitably there have been problems, and it remains to be seen whether the resultant Domesday video discs find any commercial application. Nevertheless, the Project is one of the most innovative and ambitious attempts to take computers out of the classroom and into the real world.

On show

□September 4-8, Personal Computer World Show, Olympia, London. Details on 01-486 1951.
□September 28, Micros in Weather Education, Chelsea College, London. Conference to discuss the usefulness of micros in weather education – plus hands-on experience of packages and systems. Cost £7.50. Further details from Royal Meteorological Society, James Glaisher House, Grenville Place, Bracknell, Berks.
□October 16-18, Computer Graphics, Wembley, London. Details on 01-868 4466.

On radio

□Commercial radio, not to be outdone by its big brothers in TV, gets its own national computer show – *Datarama*. The series of half-hour weekly broadcasts will go out in September on at least 30 local radio stations and it will carry a mix of news, gossip and reviews, and will broadcast software. Produced by Radio West in Bristol, the series will carry advertising and is due to run for at least a year (page 15).

On television

□*Database* takes a well-earned break over the summer but there will be a special programme coming from the PCW Show. This will go out on September 5 at 11.30pm to Thames viewers (time may differ for other ITV regions).
□*With a Little Help from the Chip* is finally broadcast this month after being postponed several times. The series of six programmes shows how micros can help the disabled and covers employment, education, mobility and communications. The first programme is a 50-minute documentary and goes out on BBC2 at 7.35pm on August 30. Subsequent programmes are 25 minutes long and broadcast at 7.45pm weekly.
□*Women in Science and Technology*. Few details at the moment of this important BBC series starting in October. Watch this space.

For help

□To contact *Acorn User* authors, write c/o the editorial address given on page 2.
□Seikosha AP/GP100 printer help sheets are available from *Acorn User* for 50p, plus sae. These consist of three programs, including a screen dump, and three pages of notes on using these printers.
□Monitor choice: Photocopies of the review of four monitors, plus a set of nine test programs from the June issue cost 72p (inc post). A copy of the issue costs £1.25 (page 93).
□For *Acorn User* cassettes, discs, back issues, binders, contact PHS Mailings on (02937) 72208 (see page 96).

To contact

□Technomatic's bulletin board service, containing information on products the company stocks, is open 24 hours on 01-450 9764. Baud rate: 1200/75.
□Acorn's own dial-in viewdata service is on (0223) 243642. Baud rate is 1200/75.
□Teachers interested in the Acorn Micros in Schools scheme can contact Acorn's education division on (0223) 245200.
□BBC TV's *Micro Live* bulletin board is on 01-579 2288 (type INFO BBC on Telecom Gold electronic mail system).
□BBC Computer Literacy Project, Broadcasting Support Services, PO Box 7, London W3 6XJ. Please send sae.
□Bulletin Boards:
CABB 01-631 3076
CBBS Cumbria (06992) 314
CBBS London 01-399 2136
Distel 01-679 1888
Forum 80 Hull (0482) 859169
Forum 80 London 01-902 2546
HAM-NET (0482) 497150
Liverpool Mailbox 051-428 8924
Mailbox 80 (0384) 635336
Microweb 061-456 4157
TBBS London 01-348 9400
TBBS Nottingham (0602) 289783
TBBS Southampton (0703) 437200
□Bardsoft database contains information on a wide range of software for the handicapped. Details from Handicapped Persons Research Unit, Newcastle-upon-Tyne Polytechnic, Newcastle NE7 7TW. (0632) 358211.
□CABE (Computers in Adult Basic Education), c/o Pete Jeffs, Southern Neighbourhood Council, Hyslop Street, Liverpool 8. User group for ABE tutors in Adult and Further Education. Please send sae.
□MEP (Microelectronics Education Programme), Cheviot House, Coach Lane Campus, Newcastle-upon-Tyne NE7 7XA. Hardware and software support for schools. Please send sae.
□MAPE (Micros and Primary Education), c/o Barry Holmes, St Helen's Primary School, Bluntisham, Cambs. User group for primary teachers. Please send sae.

TWININGS

Collect two vouchers from Twinings tea bag boxes and you can get 30 per cent off these Acornsoft titles. All prices are for cassette versions and include post and packing.
For the BBC micro: *Elite* (£10.46), *Podd* (£4.89), *Tetrapod* (£6.96), *Watch your Weight* (£8.33), *Crazy Tracer*, *Meteor Mission*, *Picture Maker*, *Go*, *Gateway to Koros*, *Paul Daniels Magic Show* (all £6.96 each).
For the Electron: *Elite* (£9.06), *Podd*, *Snapper*, *Watch your Weight*, *Crazy Tracer*, *Firebug*, *Picture Maker*, *Go*, *Sphinx Adventure*, *Paul Daniels Magic Show* (all £4.89 each).

Blunderbox

□Some copies of the July issue contained a smudged line in the listing for Peter Rochford's Disc Menu program. The line should read:

```
990M%=T%?&F:N%=
T%?&E:B%=T%?&D:
P%=T%?&C
```

□Also in the July issue, Richard Gledhill's verify routine in Atom Forum is missing some lines at the end. Please add:

```
750 P=P+LENP;[
760 NOP
770 RTS
780 :LL9 JSR£FC63
 \ REWIND TAPE
790 JMPLL1
800 ]
810 N.
820 P.$6
830 E.
```

□The road safety software praised by Nick Evans in the July issue costs £14.50. Cheques should be made payable to D A Seume and sent to Surrey County Council Road Safety Section, Highway House, 21 Chessington Road, West Ewell, Epsom, Surrey KT17 1TT.
□Martin Phillips has cured the following bugs in *Easyplot*. Insert the following line in PLOT 2 to stop the program ending if the wrong mode is entered:

```
50 ON ERROR MODE 4:
PROCm
```

When using the character definer, two characters can become corrupted by the double height routine. This can be overcome by changing each occurrence of the value 240 to 158, and of the value 241 to 159. The following lines will need changing. In the August issue (pages 106 and 107):

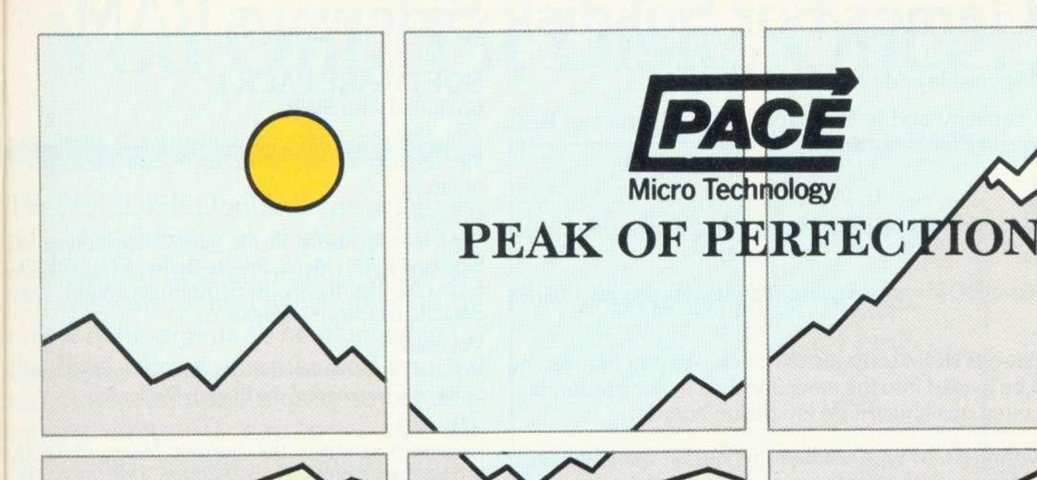
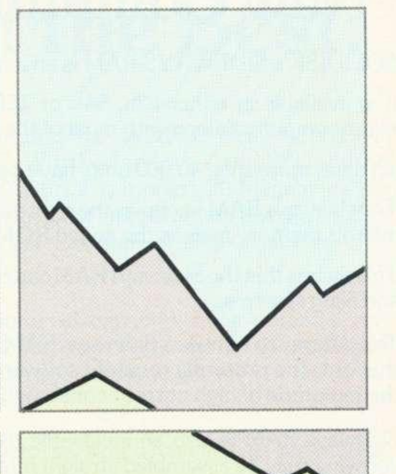
PLOT: lines 1670, 1700, 1710
PLOT 2: line 490

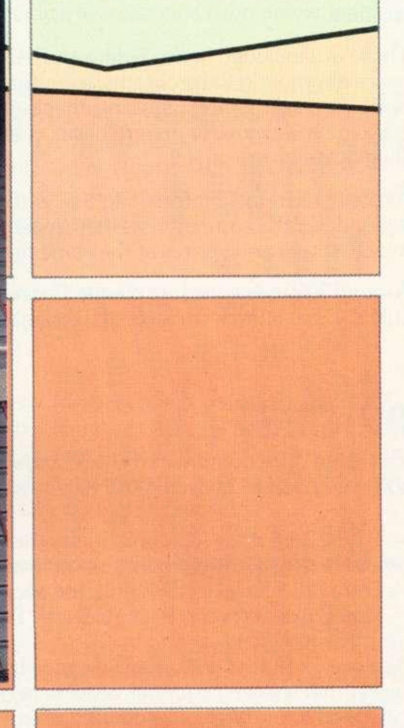
On page 103 of this issue:

RUNPLOT: line 20100

How to present programs and articles

FIRST read the 'Notes for Authors' on the contents page.
Your submission should be original and have a practical use. We receive many articles on subjects we have already covered – often quite recently.
A neat and clear presentation is very important. A few hours' thought about how your article looks, diagrams, applications and documentation will ensure that it is evaluated quickly and efficiently, and is more likely to be accepted.
Program presentation is also important. Follow the 'standard' we've adopted in the yellow pages. Most importantly, your program must run on Basic 1. The only exception is if the program is of a Basic 2 tutorial nature. Basic and illegal calls to routines in the MOS should not be used. Program lines should increment in steps of 10, with the first four being REMed as per the format in the yellow pages.
Program listings should not be indented, and avoid multi-statement lines.
Use the standard assembler presentation, one mnemonic per line, upper case mnemonics with lower case labels. If the assembler is long include a checksum.
Provide a list of PROCs, FN's and variables detailing the operation of each on a separate sheet of paper, along with any hints or tips regarding entering the program.


PACE
Micro Technology
PEAK OF PERFECTION


PACE
Disc Systems


New Computer Games For Solidisk Sideways RAM

SOLIDISK's SIDEWAYS RAM is an almost indispensible add-on for the BBC user.

It is available in either 32k, 64k or 128k byte capacity and is compatible with all issues of BBC microcomputers along with most of the add-ons and ROMs obtainable for it.

To date, more than 40,000 units have been sold.

The sideways RAM occupies the right most ROM socket of the BBC and sits in the same position in the micro's memory map as the paged ROMs.

This means that the Sideways RAM can run almost all ROM type software including languages, utilities and filing systems.

The difference between Sideways RAM and Sideways ROM is that RAM can be written to meaning that only the presently required software has to be loaded into the machine, thus making redundant the multitude of high current consumption and often unsightly ROM extension boards.

Sideways RAM is also an invaluable tool for writing ROM type software to run on the BBC since software may be assembled straight into the area in which the final version will run.

For the user who is not interested in writing ROM type software but is in need of the utilities provided by the use of the Sideways RAM, we supply free software to make maximum use of the Sideways RAM facilities.

These are included in the Sideways RAM Software package, a collection of no less than 5 diskettes containing nearly 100 programs, from database, word processor, music system, sprite graphic, printer buffer, virtual memory, spelling checker, RAM disk, RAM filing system, VDU replay, disassembler, machine code monitor, macro basic, video digitised pictures etc . . . and Solidsk Most Advanced Disk filing System version 2.0.

Another extremely interesting use is to run Solidisk 'Megagames'. They are too large for the non expanded BBC computer, as they make use of high resolution 8 colour (mode 2) screen, background music, sound and sprites at the same time.

Around 70 megagames are planned for release in 5 Megagames Packs at the official Acorn Show (25-28 July 85). Each Pack consists of 5 diskettes, available in either 40 or 80 tracks.

PRICES

The listed price comprises the Sideways RAM fully guaranteed for 1 year, comprehensive manual and software pack 1 consisting of 5 diskettes formatted either in 40 or 80 track.

— SWR32 + 5 discs (32k unit, by far the most popular): £58.00
— SWR64 + 5 discs (64k unit, new introduction model): £85.00
— SWR128 + 5 discs (128k unit, the second most popular): £135.00
— Any Extra Software Pack (5 discs): £10.00. Specify 40 or 80 tracks.

As Solidisk Software Support Service has to produce in excess of 25,000 diskettes every month, we regret that we can no longer provide personalised service for disk washing. In extreme cases, when you need to update your software diskette, either reorder a new software package (which is always sold to you at nominal media cost i.e. £10.00 for 5 disks, including new manual, post and packing) or return the old package with £2.00 to cover post and packing. You may avoid post and packing costs if you call at Solidisk's stand at any BBC micro exhibition or at the Solidisk office.

UPGRADING

Upgrading from a smaller model is very simple: you return the old RAM board to us with your payment for the difference.

The listed prices include new manuals when necessary.

SOFTWARE PACK 1
(included with SWR)

The Software package comprises 5 diskettes, formatted either in 40 or 80 track. Please specify when ordering.

Volume 1:
Volume 1 contains all the general applications of Sideways RAM. Menu, Printer Buffer, STL DFS 2.0, STL E00, RAMDISK, RFS (Rom generator), Fast Backup, Quickcopy, Index etc . . .

Volume 2:
Volume 2 contains the Solidisk Wordprocessor, Spelling Checker and the English Dictionary.

Volume 3:
Volume 3 contains the Solidisk Macro Basic (a program generator), a Linker-Editor, VMP the Virtual Memory Program, Sigen, a program to create your own dictionary and a sample French dictionary.

Volume 4:
Volume 4 contains the Solidisk Database.

Volume 5:
Volume 5 contains the Solidisk Sprites System.

SOFTWARE PACK 2
(optional)

Volume 6:
Volume 6 contains the Solidisk Spreadsheet.
Menu driven with standard options to create, edit, recalculate, print, search, sort, report generator and mailmerge.
Unlimited number of rows and columns. Each column can be as small as 2 or as big as 70 characters. All math functions are supported. Complete with home banking and simple portfolio management.

Volume 7:
Volume 7 contains Solidisk Play Tunes System and lots of tunes and write music using ordinary ABCD notation.

Volume 8:
STL Toolkit has 24 star commands (Status, Rwipe, Check, Find, Search and Replace, Mode 8, Join, Keyload, LVAR, Salvage, Expand, Edit etc . . .).
STL SFX is Solidisk screen effects utility. In mode 2, you can scale, move, reverse, mirror etc with superlative ease.
VDURECORDER is another screen aid utility. It remembers everything sent to the screen. When you want it, *REPLAY will show it all over again but with an incredible speed.
Solimon is a machine code monitor for both 6502 and 65C02.

Volume 9:
Volume 9 contains the STL ADFS and disc utilities (see next page).

Volume 10:
Volume 10 contains the Solidisk Teletext Editor.

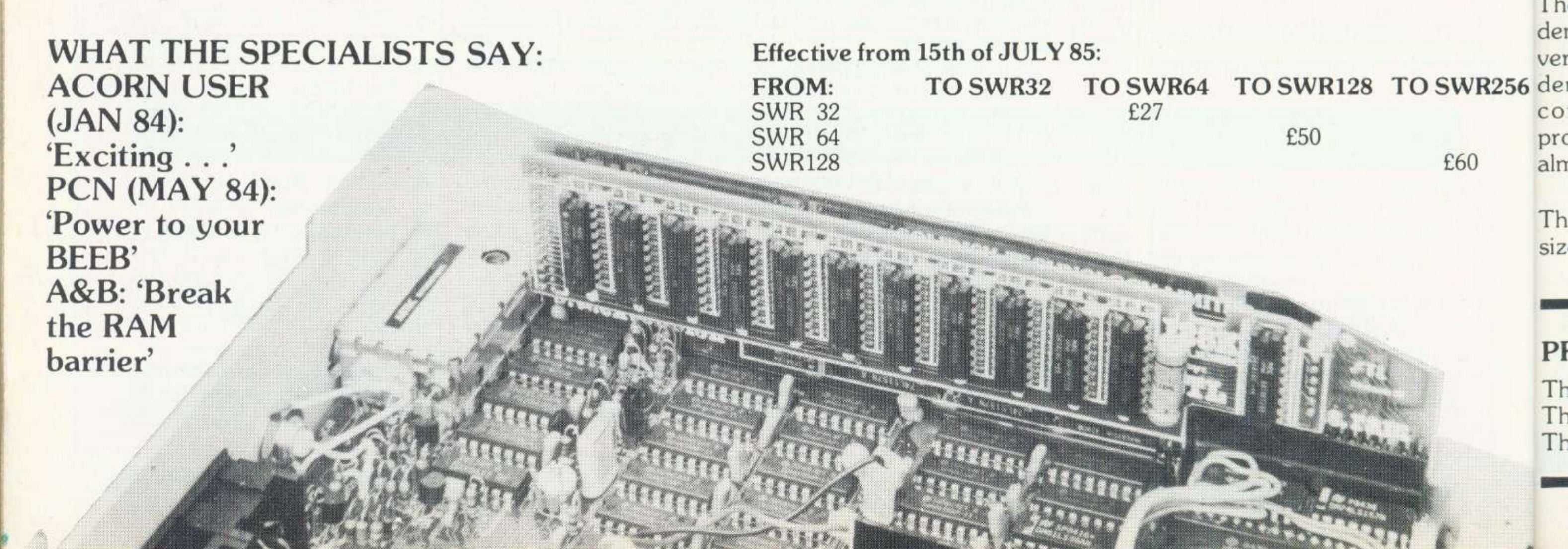
Megagame Packs:
Around 70 games are currently under compilation.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

WHAT THE SPECIALISTS SAY:
ACORN USER (JAN 84): 'Exciting . . .'
PCN (MAY 84): 'Power to your BEEB'
A&B: 'Break the RAM barrier'

Effective from 15th of JULY 85:

FROM:	TO SWR32	TO SWR64	TO SWR128	TO SWR256
SWR 32		£27		
SWR 64			£50	
SWR128				£60



You Only Fit Disks Once. Fit the Best.

The SOLIDISK Double Density DFS is now the ultimate in reliability with a minimum component count and excellent software. The DDFS consists of only 4 components to be plugged in to the BBC Microcomputer and can be fitted in just a few minutes by novice and expert alike. It can now run all Acornsoft games (such as Elite, Aviator, Revs, Magic Mushrooms etc. . .) and most other protected discs (Castle Quest, Island's Music system etc. . .)

SOLIDISK relies on a good product and a large support network to win the heart of the user.

With over 75 local experts, covering England, Scotland and Wales, a SOLIDISK National User Group in Holland and soon in Australia, SOLIDISK can offer many users regional free fitting and advice. Also with an ever increasing catalogue of free software, available to all SOLIDISK users.

Even users who are new to the Disc System can expect to build up a large disc program library in a fairly short time.

Solidisk Software Support Service now has a responsibility for over 50,000 users and the ability to give you the best possible support matched only by the largest companies.

WHICH DFS DO YOU NEED?

SOLIDISK produce no less than three types of Disc Filing Systems to cover all your requirements.

1. THE FLEXIBLE DDFS

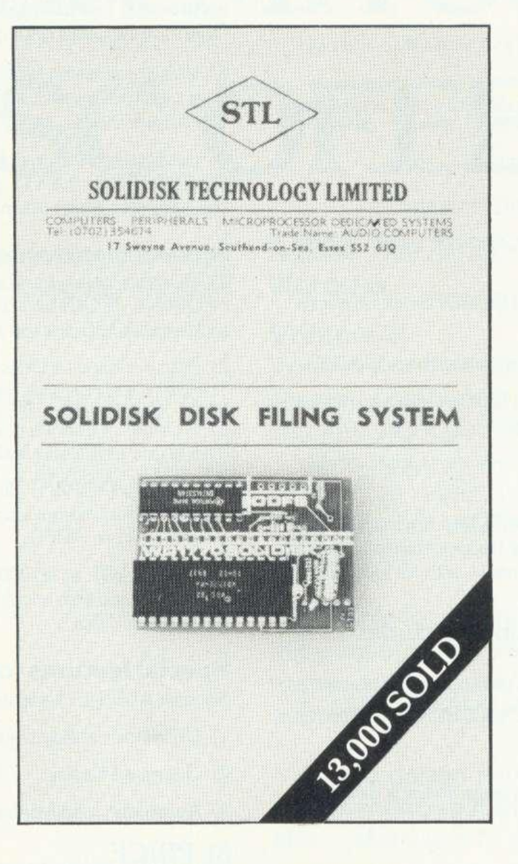
The basic SOLIDISK DDFS is suitable for all ordinary users.

The 1.9 ROM handles both single and double density formats, with built in disc formatter and verifier, along with such features as automatic density sensing and 40/80 track software controlled switching. The disc speed is programmable by the keyboard links to suit almost any type of disc drive.

The 1.9 ROM supports also file size up to disc size.

PRICE

The STL DDFS with 1.9 ROM £40.00
The STL DDFS with 2.0 ROM £45.00
The STL DDFS with 2.1 ADFS £55.00



2. THE DFDC TO UPGRADE ACORD DFS:

Ideally suitable if you already have an Acorn DFS. The DFDC will not only add Double Density capability but also improve the speed of your 8271 chip.

The SOLIDISC DFDC (Dual Floppy Disc Controllers) is making a very large impact on the BBC user community with its versatility.

The DFDC board simply sits in the place of the 8271 FDC chip (i.c. 78) in the BBC. The 8271 is then inserted into the DFDC board and the ROM 2.0 inserted in place of the original DFS ROM.

Once the machine is up and running it is then simplicity itself to change FDC's; just throw the switch attached to the DFDC board, press BREAK and the other FDC is now selected.

PRICE

The STL DFDC with 2.0 ROM £55.00
The STL DFDC with 2.1 ADFS £65.00

THE SOLIDISK WINCHESTER DISC SYSTEM (XD20-40)

This most powerful Winchester system for the BBC computer to date plugs straight into the 1Mhz bus in a few seconds.

Based around the WD1002 SHD controller, Mitsubishi Winchester drive, Astec PSU and the Solidisk ADFS 2.1, it offers 20 Megabytes (26 MB unformatted) and can easily be upgraded to a theoretical maximum of 1300 Gigabytes.

Its phenomenal capacity, huge potential and excellent features make the most expensive Winchester systems look green.

On the technical side, it has very fast seek and an exceptionally low skew factor of 11 (meaning 3 sectors are read or written in one single revolution). It gets ready very quickly too, needing only a few seconds from power up.

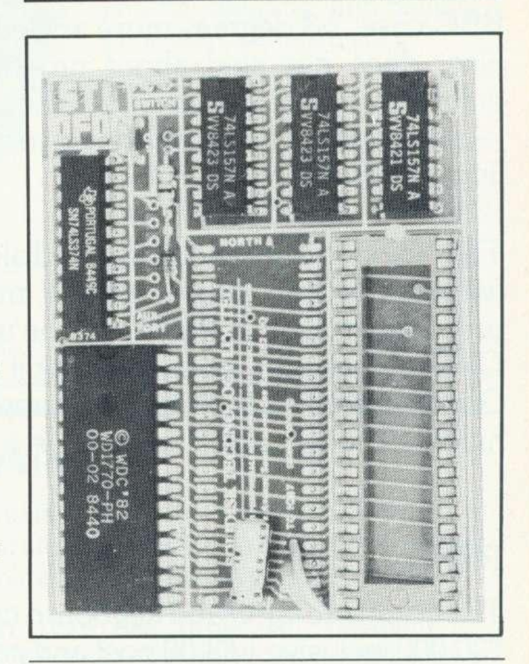
Unlike many other sources of Winchester disc drives, Solidisk Winchester system is properly driven by the Solidisk ADFS 2.1 ROM, compatible with Acorn Winchester specifications and with Acornsoft View, Viewsheet and Viewstore database.

It also runs Gemini's Datagem and Acorn second processors.

It has nice features such as read after write, Password protection, Automatic Winchester to Winchester and Winchester to floppies Backup facilities and a fantastic average file transfer speed of 64k bytes per second.

PRICE:

20 MB Winchester (excluding VAT) £700.00
30 MB Winchester (excluding VAT) £900.00
40 MB Winchester (excluding VAT) ..£1100.00
60 MB Winchester (excluding VAT) ..£1300.00



SOLIDISK TECHNOLOGY LIMITED
17 SWEYNE AVE, SOUTHEND-ON-SEA,
ESSEX SS2 6JQ
TEL. SOUTHEND (0702) 354674 (10 lines)

YOU SHOULD KNOW ABOUT ADFS AND USE IT

ANNOUNCING THE SOLIDISK ADFS 2.1

What is important on a Disc Filing System is how effectively it uses the disc, how fast it loads the programs, how many entries are on the disc and how big they are.

The old BBC DFS leaves most 80 track discs half empty on side 0 and wastes side 2 of most double sided discs.

The new ADFS treats side 0 and side two (if available) as a single disc and uses them to the full.

The old BBC DFS uses single density, the ADFS double density which is twice as fast and stores twice as much.

The old BBC DFS can only handle 31 files of less than 256k bytes in size.

The ADFS can handle thousands of files, up to 600 Gigabytes in size!

If you are afraid that the ADFS is complicated to learn, don't be put off. It isn't complicated at all.

Most of the commands are the same in both systems and the ADFS ones are very much intuitive.

If you know the BBC DFS, a few hours are all you need to master the new ADFS.

You won't regret it. After all, each ADFS disc saves you £2.00 or more on media cost, and the ADFS ROM will pay for itself in a few days.

The Solidisk Advanced Disk Filing System for the BBC computer is now available for both Solidisk DFS and Acorn BBC Plus users.

This massive piece of software is supplied on two 16k ROMs for the BBC B computers or on a 32k ROM for the BBC Plus computers. It supports both the old BBC DFS and the Acorn ADFS. It also provides the users with 20 extra disc utilities.

Standard features for both implementations include:

1) Automatic Write Error Correction.
Every disk write operation is automatically followed by a read operation to ensure that the recorded data is free of all errors. Then if need be, the STL ADFS 2.1 will restart the write operation from the unsafe sector.

2) Automatic 40/80 track stepping.
The STL ADFS will let you read and write 40 track discs on an 80 track drive and copy over from any format to any other format.

3) Disc repair facilities.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER), rewrite multiple sectors (*RESTORE), read bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC discs.

4) Tape to disc facilities.
Direct transfer from tapes to disc (*TAPEDISC) will work with all unprotected programs. *TAPELOAD and *TAPESAVE will cope with more difficult ones. Only in some cases (multipart games cassettes) will you need Solidisk tape copier.

5) Wordprocessing facilities.
This facility allows !BOOT and other text files to be edited, saved and printed in any screen mode.

6) automatic disc sensing.
On Shift Break, the STL ADFS will automatically detect the disc format and use the right disc filing system to run it.

Special features for the ADFS implementation:

1) Disc formatting facilities.
*FORM40, *FORM80, *FORM160 and *WFORM (for the Winchester) allow you to format ADFS discs in any drive.

2) Disc verifying facilities.
*VERIFY will check all disc sizes including Winchester for media defects.

3) Number of opened channels.
This is one of the star features of Solidisk ADFS.

This facility (*OPEN) allows you to specify how many files will be opened in a program, thus maximising the available RAM while avoiding buffer page swapping as in the Acorn ADFS.

It leaves PAGE at &1900 for most programs, gives extra memory to View and Viewsheet and also avoids unnecessary conversion work on programs originated for the BBC DFS.

Special features for the BBC DFS implementation.

Solidisk ADFS 2.1 handles both single and double density. In addition, it supports:

1) Unlimited catalogue entries (up to disc capacity) without any preparation.

2) Unlimited filesize.

3) Automatic media detection.

8) PRICE

2.1 ROM set	£20.00
Upgrade from 1.9	£15.00
Upgrade from 2.0	£10.00

SOLIDISK KEYBOARD AND CPU

ARE NOT JUST PRETTY . . .

The keyboard is 12 mm lower than the normal BBC case, 2-3 degrees more angled, weighs only 5lbs, does not skid about on the desk while enjoying 2 feet of freedom from the computer unit — and makes a lot of difference to typists (even 2 fingered ones!).

The CPU accommodates 2 disk drives and withstands any heavy weight monitor while providing easy attachment for the whole system, CPU and disk drives, to the desk if need be. Good ventilation to the power supply too and hides all untidy cables away.



PRICE

The complete CPU and keyboard case costs £30.000 inclusive + £3.00 post and packing. The system could be yours free as part of the Mitsubishi twin discs offer.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

SOLIDISK MITSUBISHI DISC OFFER

A Complete Disc System containing everything you need, including 1 Blank Diskette, at a new low price of only £199.00 inclusive.

The Mitsubishi Offer Comprises:

— One Mitsubishi MF4853, Double Sided, 80 Track Disc Drive. Cased in beige with all leads.
— One Solidisk DDFS complete Disc Upgrade with 2.0 ROM.
— 1 Verbatim MD525 Blank Diskette.
— 1 Software Pack and User Manuals.
— Full one year guarantee.

PRICE: 200.00.

HARDWARE:
As described earlier as shown opposite.

THE SOFTWARE:
The software comprises 5 diskettes, formatted in 80 tracks.

Volume 1:
Solidisk Word Processor and Spelling checker with English dictionary. Easier than View, Wordwise or Scribe, you enter the WP by *WP filename , then start typing. What you see on the screen will be exactly printed on paper.
Most useful commands are all displayed on the top part of the screen.
It features 80 column screen throughout with direct on screen justification, automatic margins, page numbering, Wordstar like editing commands for block move, block delete, block copy, print, save, load text to cursor, insert and overwrite, search and replace, total word count, word frequency count, free space, *commands etc.
Solidisk WP loads and saves texts in under 1 second flat and also you may save the edited version as many times and under any filename you like.

It has the unusual ability to spellcheck your document without leaving it, simply by typing in Control-U.

It has self dictionary generating capability too. You may create any dictionary you like by just simply entering the words.



Solidisk WP is also excellent as secretarial training for Wordstar.

Volume 2:
Volume 2 contains Solidisk Database. It is a random access system, completely menu driven and easily customised to suit any particular filing need.

It features unlimited filesize and number of records, supports all maths functions and 80 column screen throughout.

It is simple to understand and to use. You take one of the 15 different options to start. Each option will then lead to a new menu and so on. Mostly you only have to enter an appropriate data or hit the RETURN key.

You can design new databases list all records, edit them, merge them, split them, making mailshot with Solidisk WP etc. . . We use it to process all your orders.

Volume 3:
Volume 3 contains Solidisk Spreadsheet. Menu driven with standard options to create, edit, recalculate, print, search, sort, report generator and mailmerge.
Unlimited number of rows and columns. Each column can be as small as 2 or as big as 70 characters. All math functions are supported. Complete with home banking and simple portfolio management.

Volume 4:
Volume 4 contains the Solidisk tape to disc program and a selection of computer games.

Volume 5:
Volume 5 contains MBASIC, SIGEN and other disc utilities.

IMPORTANT:

If you upgrade to a twin Mitsubishi disc system, Solidisk will offer you, subject to stock availability, a completely free set of CPU and keyboard case as shown earlier.

You should return your disc drive with payment for another Mitsubishi MF4853 (£160.00) or alternatively, save by ordering right now a Fantastic Offer at only £340.00.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

SOLIDISK EFS COMBINES DISC
AND A SOCKET FOR THE W

Solidisk Double Density DFS is now the ultimate in reliability and supported by the largest amount of software available for the Electron.
Solidisk relies on a good product and a large support network to win the heart of the user.
With over 75 Local Experts, covering England, Scotland and Wales, Solidisk can offer many users regional free fitting and advice.
With an ever increasing catalogue of free software, even users who are new to the Disc system can expect to build up a large library in a fairly short time.
Solidisk Software Support Service already has responsibility for over 50,000 BBC computer users and the ability to give you the best service matched only by the largest companies.
Solidisk Double Density DFS handles both BBC Discs and Electron Discs, in single and double density whereas the Acorn's PLUS 3 can only handle ADFS discs.
Solidisk ADFS has nice features such as automatic disc format sensing, built-in disc formatter and verifier and programmable disc speed.
It also has more than 20 disc utilities built into the ROM.
Standard features for both BBC DFS and ELECTRON ADFS implementations include:
1) Automatic Write Error Correction.
2) Automatic 40/80 track stepping, the ADFS 2.1 will let you read and write 40 trak discs if you have an 80 track drive.
3) Disc repair facilities.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER) rewrite multiple sectors (*RESTORE), read bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC discs.
4) Tape to disc facilities.
Direct transfer from tapes to disc (*TAPEDISC) will work with all unprotected programs. *TAPELOAD and *TAPESAVE will cope with more difficult ones. Only in some cases (multipart games cassettes) will you need Solidisk tape copier.
5) Wordprocessing facilities.
This facility allows *BOOT and other text tiles to be edited, saved and printed in any screen mode.
6) Automatic disc format sensing.
On Shift-Break, the STL ADFS 2.1 will detect the disc format and use the right BBC DFS or Electron ADFS to run.
On the Electron ADFS side, the 2.1 ROM also has some very nice features:
1) Extensive Disc formatting facilities.
*FORM40, *FORM80, *FORM160 and *WFORM (for the Winchester) are available to handle any disc drive.
2) Disc verifying facilities.
*VERIFIFY will check all disc sizes including Winchester for media defects.
3) Number of opened channels.
This is the star feature of Solidisk ADFS.
This facility (*OPEN) allows you to specify how many files will be opened in a program, thus maximising the available RAM while avoiding buffer page swapping as on the Acorn ADFS.
It leaves PAGE at &1900 for most programs, gives more room to View and Viewsheet and avoids unnecessary conversion work for many programs originated for the BBC DFS to be run on your Electron.

On the BBC DFS side, the STL ADFS 2.1 handles both single and double density and in addition, it supports:
1) Unlimited catalogue entries.
2) Unlimited filesize.

THE SOLIDISK 16k SIDEWAYS RAM:

Solidisk Sideways RAM is an almost indispensible add-on for the Electron with disc drives.
The Sideways RAM occupies the same memory area as the BASIC or ADFS ROM in the micro's memory map. This means that Sideways RAM can run almost any ROM type software, including languages, utilities and games.
Sideways RAM is notably invaluable to run games and specially "MEGAGAMES".
Games and programs run at 2MHz clock speed in Sideways RAM, if loaded into the Electron RAM, they can only run at 1MHz clock speed, ie half the speed of Sideways based games.
Megagames are too large to be run on the unexpanded Electron. They use extensively 8 colour high resolution screen (mode 2), background music, sound and high speed sprites.
Solidisk supply free software to maximise the use of Sideways RAM on the Electron. These include Wordprocessor, Spreadsheet, Database, Toolkit, Machine Code Monitor, Printer Buffer, Sprites, Playtunes, Virtual Memory Processor, VDU Replay, Screen Effects, digitised pictures etc . . .

THE WINCHESTER SOCKET:

Solidisk has the most powerful Winchester system for the BBC computers and the Electron. The Winchester system can provide from 20 Megabytes to a theoretically possible 1300 Gigabytes of storage, directly on line with the Electron.
The same Winchester unit can be used on the BBC B, the BBC PLUS and the Electron without any change.
You can read more about it in BBC Micro User or in Acorn User Magazines. Price of a 20 Megabytes system is only £700.00 + VAT (£805.00).



[C]UPGRADE, 16K SIDEWAYS RAM [W]NCHESTER FOR ONLY £59.00

SOLIDISK SPECIAL MITSUBISHI DISC OFFER:

This offer comprises:
— One 80 track Double Sided (640 kbytes) 3.5" Mitsubishi disc drive with its own PSU. Cased in beige.
— Solidisk EFS Disc Upgrade, 16K Sideways RAM and Winchester socket.
— One software package containing four 3.5" discs, detailed below.
— Full one year guarantee and 2 manuals.

PRICE: £200.00

You can also order as many Megagame Packs at the same time as you like. Each Megagame Pack consists of three 3.5" discs and contains on average 20 games.

THE SOFTWARE:

The software contains everything to start a library: the big four (Database, Wordprocessor, Spreadsheet and Graphic), Utilities and Games.

Database:

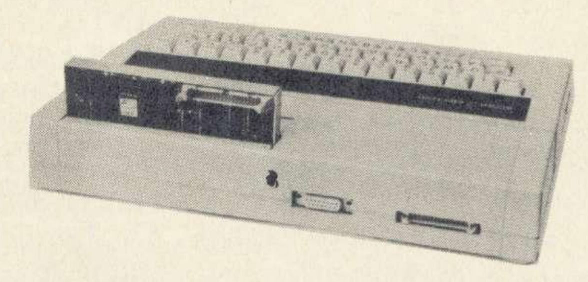
Solidisk Database is very easy to understand and use. You are presented with a 15 option Menu. Each option will lead to a new Menu and so on. Mode 3, 80 column screen is used throughout so that what you see is what will be printed on paper. With Solidisk Database, you can create as many records as you like, each record can be up to 15 fields of up to 60 characters. You can sort, search, index, mailmerge, append, create subset, calculate etc. Solidisk use the same Database to process all your orders.

Wordprocessor:

Solidisk Wordprocessor is WYSIWYG type (What You See Is What You Get) and has all the commands of a professional tool. It features 80 column screen, on screen justification, page numbering, search and replace, word count, free space, Wordstar like editing commands: insert and overwrite, block mark, move, copy, delete, save, load to cursor, * commands etc..

Spreadsheet:

Solidisk Spreadsheet is also Menu driven and has the same file structure as Solidisk Database. You can have as many rows and columns as you like, each column can be as small as two characters wide or as big as 70 characters. All maths functions are



supported. Recalculate, Replicate, Print, Print If, Sort, Search, Define Zone, Mailmerge, Text Input/Output etc . . . are included.

Toolkit:

Solidisk Toolkit is almost indispensible for Electron programmers, it has 24 star commands (Status, Rwipe, LVAR, Move, Search and Replace, Expand, Salvage, Keyload etc . . .).

ORDER FORM

PRICE LIST and ORDER FORM.	Price	P&P
Diskettes.		
Verbatim 3.5" box of 10	£40.00	£1.00
Software Pack	£10.00	£1.00
Solidisk EFS	£59.00	£1.00
Disc Offers.		
640k Mitsubishi MF453 Disc Outfit	£200.00	£3.00
1.3 MB Fantastic Offer	£310.00	£3.00
20 MB Winchester system	£805.00	£10.00
	Total =	

Name: ______________________

Address: ______________________

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Payment ☐ Cheque ☐ Cash or Postal Orders
☐ Bank transfer ☐ Other means.

Access or Barclay Credit Card Account: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

You can also order by phone 0702-354 674 9AM-5.30PM

**SEND TO:
SOLIDISK TECHNOLOGY LIMITED,
17 SWEYNE AVE,
SOUTHEND ON SEA,
ESSEX SS2 6JQ.**

We reserve the right to change specifications and prices for improvements.

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★ SEE SOLIDISK MODEM AND ELECTRONIC NETWORK AT THE ACORN SHOW! ★

SOLIDISK LOCAL EXPERTS

We have people able to fit your equipment free of charge in all of the following towns. If your area is not mentioned, ring the office!

Dunstable, Leighton Buzzard, Reading, Peterborough, Penzance, Torquay, Wimborne, Basildon, Stroud, Southampton, Hoddesdon, Watford, Bexley, Margate, Rochdale, Boston, London (all areas), Oldham, Hunts Cross, East Dereham, Rushden, West Bridgford, Wantage, Bambury, Grimsby, Kingston, New Malden, Woking, Taunton, King Norton, Sutton Coldfield, Halesowen, Leamington Spa, Hassocks, Salisbury, Swallowne, Leeds, Huddersfield, Treowen Newtown, Newtownards, Co Fermanagh, Co Londonderry, Le Mesnil St Denis (France), Kalgoolie (Australia), Paramatta (New Sth Wales), Manawatu (New Zealand).

Short form price list.

Qty Items.	Prices	P&P
For the BBC B:		
Sideways RAMs:		
SWR32	£58.00	£1.00
SWR64	£85.00	£1.00
SWR128	£135.00	£1.00
CPU & Keyboard Case (both)	£30.00	£3.00
Solidisk DDFS.		
DDFS (with 1.9 ROM)	£40.00	£1.00
DDFS (with 2.0 ROM)	£45.00	£1.00
DDFS (with 2.1 ROM)	£55.00	£1.00
DFDC (with 2.0 ROM)	£55.00	£1.00
DFDC (with 2.1 ROM)	£65.00	£1.00
Special Offers.		
640k Disc Offer	£200.00	£3.00
1.3MB Fantastic Offer	£340.00	£5.00
20MB Winchester	£805.00	£12.00
30MB Winchester	£1035.00	£12.00
40MB Winchester	£1265.00	£12.00
60MB Winchester	£1495.00	£12.00
For the BBC PLUS:		
SWR16+	£58.00	£1.00
SWR64+	£85.00	£1.00
SWR128+	£135.00	£1.00

SWR256+	£190.00	£1.00
640k Disc Offer	£200.00	£3.00
1.3MB Fantastic Offer	£340.00	£5.00
Winchester Units same as above.		
For the ELECTRON:		
EFS	£59.00	£1.00
Special Disc Offer	£200.00	£3.00
Winchester Units same as above.		
Eprom Equipment		
Programmer	£20.00	£1.00
Eraser	£20.00	£1.00
2764 × 5 new low price	£24.00	£1.00
27128 × 3 new low price	£24.00	£1.00
Datalife Diskettes		
MD525 SS/DD	£17.00	£1.00
MD557 2S/4D	£28.00	£1.00
3.5" Datalife	£35.00	£1.00
Misc.		
65C02 with Software	£13.00	£1.00
Solimon-2 16k ROM	£13.00	£1.00
2.0 DFS 16k ROM	£15.00	£1.00
2.1 ADFS 32k ROM	£20.00	£1.00

Total =

Name: ______________________

Address: ______________________

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Barclay/Access: [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

We reserve the right to change prices and specifications for improvement without notice.

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FOR THE LARGEST RANGE OF ACORN & BBC PERIPHERALS

DISK DRIVES

CUMANA

CSXL100	£99.95
CSX100	£109.95
CSX200D	£129.95
CSX400	£149.95
CS100	£129.95
CS200D	£159.95
CS400S	£179.95
CS100E	£123.45
CD200	£249.95
CD800S	£329.95
351	£169.95
354	£229.95

OPUS

5401	£149.95
5402	£169.95
DDOS	£99.95

ACORN

Acorn Single	£249.00
Acorn Dual Drive	£499.00
Acorn Plus 3	£229.00

DISK INTERFACES

Acorn DNFS ROM	£20.60
Acorn Disk Interface Kit	£97.00
Acorn Electron 3½" DD I/F	£229.00
Opus Dual Density I/F	£99.95
Cumana Electron Disk I/F	£114.95

DISKS & ACCESSORIES

3M SSDD (10 Pack)	£28.52
3M DSDD (10 Pack)	£41.40
3M SSDD 80 Track (10 Pack)	£43.70
3M DSDD 80 Track (10 Pack)	£50.60
Memorex 3½" SSDD (Single)	£6.95
Memorex SSDD (Twin Pack)	£5.95
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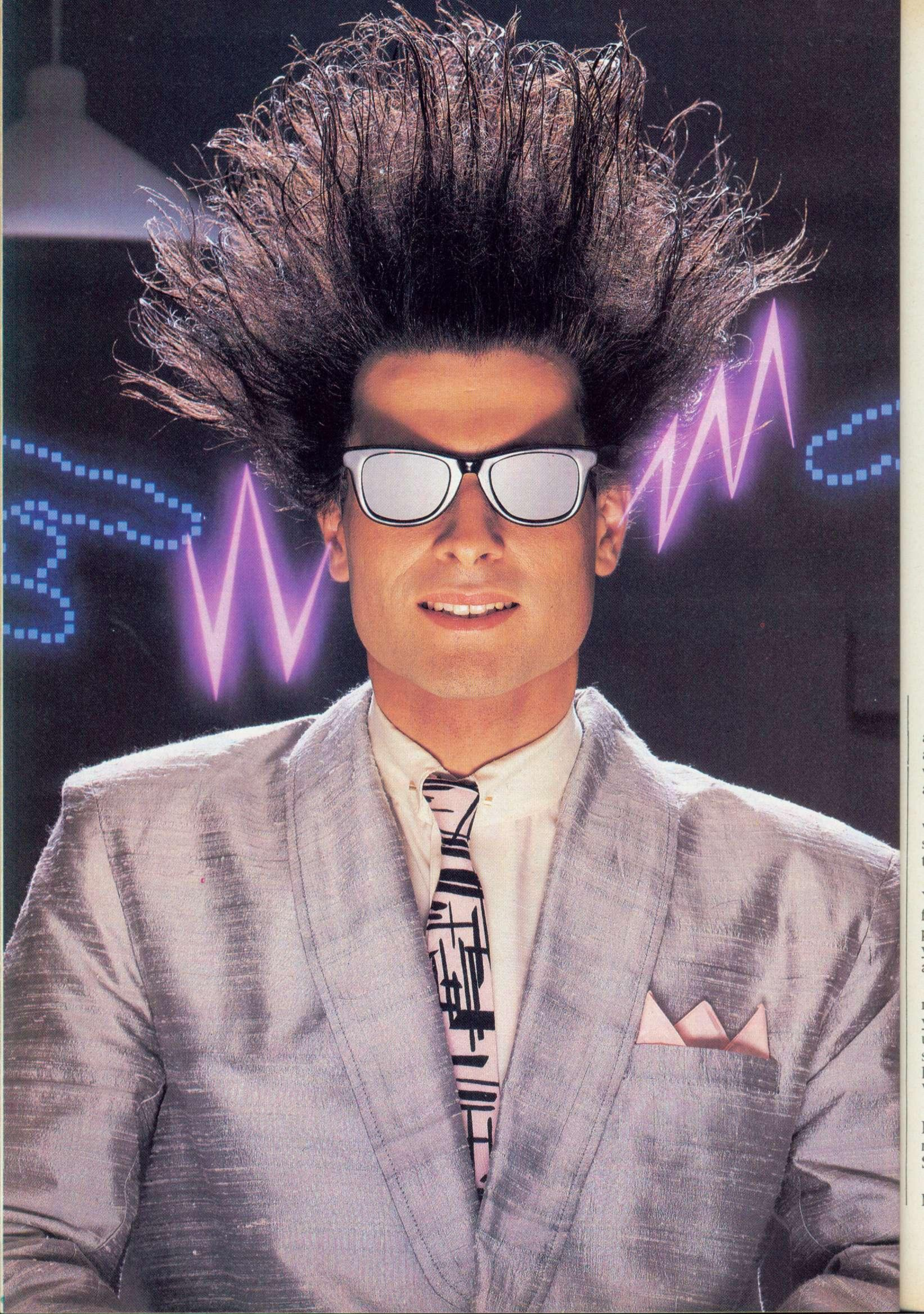
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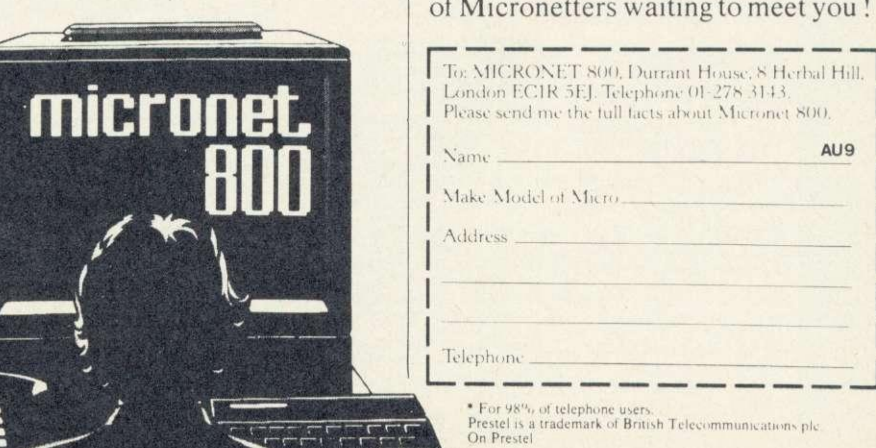
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Oldham. Boots, 1 Town Square Shopping Centre. Tel: 061-624 2525
Stockport. National Micro Centres, 36 St Peters Gate. Tel: 061-429 8080

MERSEYSIDE
Liverpool. Hargreaves, 31-37 Warbreck Moor, Walton. Tel: 051-525 1782.
St Helens. Microman Computers, Rainford Industrial Estate, Mill Lane, Rainford. Tel: 0744 885242.
Southport. Boots, 31-39 Chapel Street. Tel: 0704 33907.
St. Helens. Boots, 8 Church Street, 24 La Grange Arcade. Tel: 0744 25488.

MIDDLESEX
Harrow. Camera Arts, 42 St. Anns Road, Tel: 01-427 5469.
Hounslow. Boots, 193-199 High Street. Tel: 01-570 0156.
Southall. Twillstar Computers Ltd, 7 Regina Road. Tel: 01-574 5271.
Teddington. Andrews, Broad Street. Tel: 01-977 4716.
Twickenham. Productive Computers Ltd, 72 Heath Road. Tel: 01-891 4991.
Uxbridge. JKL Computers, 7 Windsor Street. Tel: 0895 51815.

NORFOLK
Norwich. Adams, 125-129 King Street. Tel: 0603 22129.
Thetford. Thetford CB & Micros, 21 Guildhall Street. Tel: 0842 61645.

NOTTINGHAMSHIRE
Mansfield. Boots, 39 Four Seasons Shopping Centre, Tel: 0623 23089.
Nottingham. Boots, 11-19 Victoria Centre. Tel: 0602 470676.
Nottingham. Telstar, 280 Huntingdon Street. Tel: 0602 505585.
Worksop. Computer Graphix, 32 Bridge Street. Tel: 0909 472248.

NORTHAMPTONSHIRE
Kettering. Boots, 35 Gold Street. Tel: 0536 514675.
Northampton. Boots, 9 The Parade. Tel: 0604 22573

NORTHUMBERLAND
Morpeth. Telerents (Northern) Ltd, 31 New Gate Street. Tel: 0607 513537.

OXFORDSHIRE
Abingdon. Ivor Fields Computers, 21 Stert Street, Tel: 0235 21207.
Banbury. Computer Plus, 2 Church lane. Tel: 0295 55890.
Oxford. Science Studio, 7 Little, Clarendon Street. Tel: 0865 54022.
Oxford. Absolute Sound and Video, 19 Old High Street, Headington, Tel: 0865 65661.

SCOTLAND
Aberdeen. Boots, 133-141 Union Street. Tel: 0224 585349.
Dundee. Boots, 49-53 High Street, Tel: 0382 21756.
Edinburgh. Boots, 101-103 Princes Street. Tel: 031-225 8331.
Edinburgh. Microworld Computer Group. 12 Leven Street. Tel: 031 228 1111
Edinburgh. Edinburgh Computers, 51-57 Lothian Road. Tel: 031 229 4418.
Edinburgh. Silicon Centre, 7 Antigua Street. Tel: 031 557 4546.
Glasgow. Boots, 200 Sauchiehall Street. Tel: 041 332 1925.
Glasgow. Microworld Computer Group, 11 Bath Street. Tel: 041 332 1116.
Glasgow. Boots, Union Street and Argyle Street. Tel: 041 248 7387.
Glasgow. Tom Dixon Cameras, 15-17 Queen Street. Tel: 041-204 0826.
Glasgow. Commscot Ltd, 30 Gordon Street. Tel: 041 226 4878.
East Kilbride. Boots, 33-37 The Plaza. Tel: 035 52 20629.
Falkirk. Boots, 79-91 High Street. Tel: 0324 20535.
Hamilton. Tom Dixon Cameras, 8 Cadzou Street. Tel: 0698 283193.
Peterhead. North East Computers. 1 Ellis Street. Tel: 0779 79900.

SHROPSHIRE
Shrewsbury. Computerama, 13 Castlegate. Tel: 0743 60528.
Telford. Computer Village, 2/3 Hazeldine House, Central Square. Tel: 0952 506771.
Telford. Telford Electronics, 38 Mall 4. Tel: 0952 504911.

SOMERSET
Taunton. Boots, 64-65 High Street. Tel: 0823 76061.

STAFFORDSHIRE
Newcastle-under-Lyme. Computer Cabin, 24 The Parade, Silverdale. Tel: 0782 636911.
Stoke on Trent. Town Computer Store, 30 Town Road, Hanley. Tel: 0782 287540.
Stoke on Trent. Boots, 3-5 Market Square, Hanley. Tel: 0782 23271.

SUFFOLK
Bury St. Edmunds. Boots, 11-13 Cornhill. Tel: 0284 701516.
Bury St. Edmunds. The Suffolk Computer Centre, 1-3 Garland Street. Tel: 0284 705503.
Ipswich. Computer Magic, 24 Crown Street. Tel: 0473 50965.

SURREY
South Croydon. Concise Computer Consultants. 1 Carlton Road. Tel: 01-681 6842.
Croydon. The Vision Store, 53-59 High Street. Tel: 01-686 6362.
Croydon. Boots, The Mall, 12-18 Whitgift Centre. Tel: 01-688 6021.
Epsom. The Micro Workshop, 12 Station Approach. Tel: 0372 721533.
Guildford. Guildford Computer Centre, 5 The Quadrant, Bridge Street. Tel: 0483 578848.
Wallington. Surrey Micro Systems, 53 Woodcote Road. Tel: 01-647 5636.
Woking. Harpers, 71-73 Commercial Way. Tel: 0486 225657.

SUSSEX
Brighton. Boots, 129 North Street. Tel: 0273 27088.
Brighton. Gamer, 71 East Street. Tel: 0273 728681.
Bognor Regis. Bits & Bytes, High Street. Tel: 0243 867143.
Eastbourne. Boots, 15 Eastbourne Arndale Centre. Tel: 0323 27742.
Horsham. Boots, 1 Swan Walk, Tel: 0403 53053.
Horsham. Orchard Computer Centre, 34 East Street. Tel: 0403 64884.
Worthing. Boots, 48-52 Montague Street. Tel: 0903 207106.

TYNE & WEAR
Newcastle-upon-Tyne. Boots, Eldon Square. Tel: 0632 329844.
Newcastle-upon-Tyne. RE Computing, Parkview House, Front Street, 4 Lane Ends. Tel: 091 2701740.
Sunderland. Business Micro Communications Ltd, Refuge Assurance Buildings, Saint Thomas Street, West Sunniside. Tel: 0783 654916.

WALES
Aberdare. Inkey Computer Services, 70 Mill Street, The Square, Trecynon. Tel: 0685 881828.
Aberystwyth. Aberdata at Galloways, 23 Pier Street. Tel: 0970 615522.
Cardiff. Boots, 36 Queens Street & 105 Frederick Street. Tel: 0222 31291.
Cardiff. The Computer Shop, 41 The Hayes. Tel: 0222 26666.
Cardiff. Cardiff Microcomputers, 46 Charles Street. Tel: 0222 373072.
Newport. Gwent Computers, 92 Chepstow Road. Tel: 0633 841760.
Newport. Boots, 155-156 Commercial Street. Tel: 0633 51212.
Swansea. Boots, 17 St. Marys Arcade, The Quadrant Shopping Centre. Tel: 0792 43461.
Swansea. The Micro Store, 35-36 Singleton Street. Tel: 0792 46980.

WARWICKSHIRE
Coventry. Boots, 38-42 Corporation Street. Tel: 0203 26561.
Leamington Spa. Boots, 31 Parade. Tel: 0926 24945.
Leamington Spa. Leamington Hobby Centre 121 Regent Street. Tel: 0926 29211.
Nuneaton. Micro City, 1a Queens Road. Tel: 0203 382049.
Rugby. O.E.M., 9-11 Regent Street. Tel: 0788 70522.

WEST MIDLANDS
Birmingham. Boots, City Centre House, 16-17 New Street. Tel: 021-643 7582.
Dudley. Central Computers, 35 Churchill Precinct. Tel: 0384 238169.
Stourbridge. Walters Computer Systems. 12 Hagley Road. Tel: 0384 370811.
Walsall. New Horizon, 1 Goodall Street. Tel: 0922 24821.

WILTSHIRE
Trowbridge. West Wiltshire Micros, Whiteheart Yard. Tel: 02214 67259.

YORKSHIRE
Bradford. Boots, 11 Darley Street. Tel: 0274 390891.
Doncaster. Boots, 13-15 French Gate, Tel: 0302 62238.
Barnsley. Boots, 34-40 Cheapside. Tel: 0226 82616.
Huddersfield. Micro World Computers, 1006-1010 Manchester Road, Linthwaite. Tel: 0484 846117.
Huddersfield. Boots, 22 King Street. Tel: 0484 21756.
Leeds. Boots, 19 Albion Arcade, Bond Street Centre. Tel: 0532 33551.
Leeds. Micro Power, Northwood House, North Street. Tel: 0532 458800.
Sheffield. PIP Micro Communications, 9 Taptown Crescent, Broomhill. Tel: 0742 661096.
Sheffield. Boots, 4-6 High Street. Tel: 0742 78333.
Wakefield. Boots, 26-28 Upper Kirkgate. Tel: 0924 376181.
York. York Computer Centre, 7 Stonegate Arcade. Tel: 0904 641862.



Phone 01-278 3143 for your free information pack now!
Micronet 800, 8 Herbal Hill, London EC1.

TECHNOMATIC

SEPTEMBER '85

BBC Computer & Econet Referral Centre
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and 15% VAT to order value

ACORN COMPUTER SYSTEMS

BBC Model B........ £299(a)
BBC Model B + DFS........ £346(a)
BBC Model B + Econet........ £335(a)
BBC Model B + Econet + DFS........ £399(a)
BBC Dust Cover........ £4(d)
BBC Carrying Case........ £12(b)

UPGRADE KITS

Acorn DFS Kit £80 (d) 1.2 OS ROM £7.50 (d)
Econet Kit....... £55 (d) DNFS ROM £17.50 (d)
BASIC II ROM with User Guide....... £22.50 (d)

ECONET ACCESSORIES

Econet Starter Kit........ £85 (b) Printer Server Rom........ £41 (d)
File Server Level I........ £75 (d) 10 Station Lead Set........ £26 (c)
File Server Level II........ £210 (d) Adv. Econet User Guide... £10 (d)

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1200/75 Baud. Standard Viewdata/Prestel Protocols.
Please note that a 'Prestel' type terminal must be used.

BBC B PLUS

£409 (a)

Now available from stock.

EPROMs/RAMS

2764-25........ £2.60 (d)
27128-25........ £5.00 (d)
6264LP-15........ £6.00 (d)

ACORN BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 48 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value. £325(a)

ACORN's multiplotter driver for Bitstick graphics. £79(c)
(All popular plotters included)
Epson FX80 screen dump routine for Bit Stick. £35 (d)

TORCH PRODUCTS

GRADUATE: The ultimate upgrade – converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. With 256K RAM and dual drives, it simply connects through the 1 MHz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.). The top-of-the-range Model G800/2 comes complete with the free Xchange range of software, and includes a full feature word processor, a financial package — planner, a database and a business graphics all linkable. (This highly acclaimed software is now available for the IBM PC at a cost of over £400!)

Graduate G800/2........ £899 (a)
(Offer valid for limited period only).

SPECIAL SUMMER PROMOTION on Torch Disc & Graduate

Z80 Card ZEP100 with PERFECT Software Packages + Z80 Basic........ £275 (a)
Z80 Disc Pack ZDP240 with software as above.. £550 (a)
20Mb Hard Disc + 1 x 400K Floppy Drive...... £1,950 (a)
Unicorn 68000, Unix OS/Z80B/512K, 20MB Hard Disc, 400K Floppy........ £3495 (a)

ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1 Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III can be installed on the Hard Disc before delivery.

10 Mbyte Winchester Drive £1299 (a)
30 Mbyte Winchester Drive £1999 (a)
Add £200 to the cost if File Server Level III is to be installed.

MULTI-FORM Z80 2nd PROCESSOR

This is a unique Z80 2nd processor running CP/M and allowing use of the massive range of CP/M software. What makes this unit rather special, is that it can be used with software from other CP/M computers, without the user needing specially configured software for the BBC. As supplied, the unit will read many formats and it is possible to configure the unit for virtually any other CP/M machine. Please contact us for further information.

ACORN 2nd PROCESSORS

The Z80 2nd Processor converts your BBC into a CP/M business computer. Complete with comprehensive free software. £348(a)

The 6502 2nd Processor provides both an increase in speed and memory £175(a)

ACORN MUSIC 500

Convert your BBC micro into a sophisticated music composition aid and sound effects generator. Custom made software will provide you with the flexibility to compose, experiment, perform and teach music. Stereo output can be connected to a sound system including your home stereo unit. Full specification on request. £174(a)

ACORN P-SYSTEM

The long-awaited-for portable operating system has arrived. Intended for use with the 6502 Second processor, this portable operating system is a complete implementation and comes complete with a Filer, Editor, and compilers for two languages, USCD PASCAL and FORTRAN-77. Widely used in universities and colleges, as well as being popular with business software authors, P-System is user-friendly, offering ease of program development as well as portability. £263(b)

SYMPHONY KEYBOARD

SYMPHONY KEYBOARD FROM ATPL — a professional 4 octave keyboard with sophisticated controlling software. Its multitude of facilities include simulation of musical instruments, sound effects, octave shift, pitch bend etc. etc. £108(a)
Synth-500 disc allows its use with the Acorn Music 500 **£10(d)**

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PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

LX-80 NLQ — a new low-cost high performance dot matrix printer from Epson. Its many features include Near Letter Quality, Draft mode, programmable characters, a variety of print styles, graphics etc. Supplied with friction feed.
LX-80 £242(a) Optional Tractor Feed £20(c)

JX80 COLOUR — a full colour dot matrix printer with colour text and graphics as well as many advanced printer features. £499(a)

RX 80T + £210(a)	RX 80FT + £220(a)
RX 100 + £345(a)	FX 80 + £315(a)
FX 100 + £430(a)	
KP 810 (80 col) £245(a)	KP 910 (156 col) £339(a)

BUFFALO 32K Buffer for EPSON PRINTERS

This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions. £99(d)

DAISY WHEEL

BROTHER HR15: • 14 cps • 3K Buffer • Two colour printing • Proportional spacing * Underline * * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 £315(a)

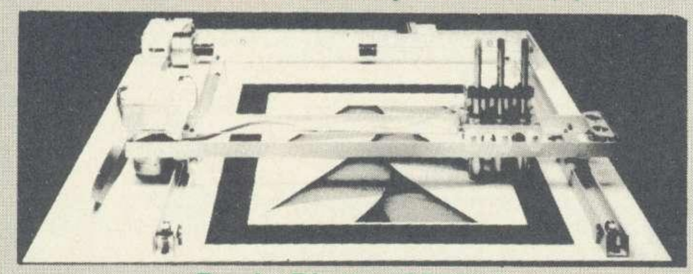
JUKI 6100: • 15 cps • 2K Buffer • Switchable 10/12/15 cpi • Proportional printing • Linear Motor for max reliability.

JUKI 6100 £310(a)

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without losing the accuracy. The servo controlled drill/router, and scriber can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs. Workstation comes complete with all accessories.

Workstation Complete £490(a)



Basic Plotter £270(a)

Opto Sensor £72(c) Drill/Router Attachment £79(c)
Power Supply: PS12V £42(c) PS24V £78(c)
Scandump Utility Disc £14.95 (d)

TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON
FX80 plus sheet feeder £129(b)
Paper Roll Holder £17(d) FX80 Tractor Attachment £37(c).
Interfaces: 8143 RS232 £28(c); 8148 RS232 + 2K £57(c);
8132 Apple II £60(c); 8165 IEEE + Cable £65(c).
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 £5.00(d); RX/FX/MX 100 £10(d); LX80 £6(d)
FX80 Dustcover £4.50(d); LX80 Tractor Unit £20(c);
Spare pens for HI80 £7.50/set (d)

KAGA TAXAN: RS 232 Interface + 2K buffer £78(c); Ribbon KP810/910 £6(d)

JUKI: RS232 Interface £65(c); Spare Daisy Wheel £14(d); Ribbon £2.50(d);
Sheet Feeder £182(a) Tractor Feed Attach £129(a)

BROTHER HR15: Sheet Feeder £189(a) **Ribbons Carbon or Nylon** £4.50(d)
Tractor Feed £99(a)

BBC Printer Lead: Parallel (42") £7(d); Serial £7(d)
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):
2000 sheets 9.5" × 11" £13(b) 2000 sheets 14.5" × 11" £18.50(b)
Labels per 1000s: Single Row 3½" × 1 7/16" £5.25(d)
Triple Row 2-7/16" × 1 7/16" £5.00(d)

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer. Detailed leaflet on request. £399 (a)

PRINTER SHARER/BUFFER

A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer £199 (a)
BBC Cable Set £30

PERIPHERAL & COMPUTER SHARERS

We now offer an extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 £69(c)	25V25-3 £64(c)
4 Computers to a Printer	36V36-4 £85(c)	25V25-4 £74(c)
2 Computers/2 Printers X-over	36V36-X £69(c)	25V25-X £69(c)
BBC Cable Set 3 to 1 (1m ea.)	£32(c)	£34(c)
BBC Cable Set 4 to 1 (1m ea.)	£39(c)	£41(c)

Computer Sharer:
1 computer to 2 printers fitted with Cable for BBC TCS26 £19.50(c).

BREAK-LOCK

A two-position key switch, fitting into the 'Ash-tray', that prevents accidental/unauthorised use of the Break key. £8.50(c).

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MONITORS

All monitors supplied with BBC lead

MICROVITEC

All 14" monitors now available in plastic or metal cases, please specify your requirement.

14" RGB		with PAL & Audio	
1431 Std Res	£185(a)	1431 AP Std Res	£205(a)
1451 Med Res	£240(a)	1451 AP Med Res	£280(a)
1441 Hi Res	£389(a)	These monitors can receive TV programs thru a Video Recorder	

Swivel Base for Plastic 14" Microvitecs £20(c)

20" RGB with PAL & Audio

2030CS Std Res £380(a) 2040CS Hi Res £685(a)

KAGA TAXAN 12" RGB

VISION II Hi Res £225 (a) VISION III Super Hi Res £325 (a)

SANYO CD3125NB 14" RGB Std Res £159(a)

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen	£95(a)
KAGA KX1201G Hi Res 12" Etched Green Screen	£99(a)
KAGA KX1203A Hi Res 12" Etched Amber Screen	£105(a)
PHILIPS BM7502 12" Hi Res Green Screen	£75(a)
PHILIPS BM7522 12" Hi Res Amber Screen	£79(a)
Swivel Base for Kaga Monochrome fitted with Digital Clock	£21(c)
Monitor Plinth for the BBC	£13.50(b)
Double Tier Plinth for BBC and flat pack dual drive	£19.50(b)

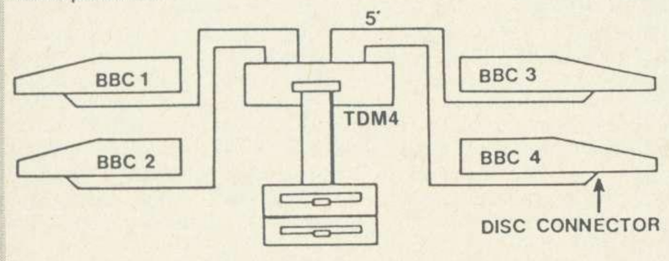
BBC Leads Kaga RGB £5(d) Microvitec £3.50(d) Monochrome £3.50(d)

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software. £260(b)

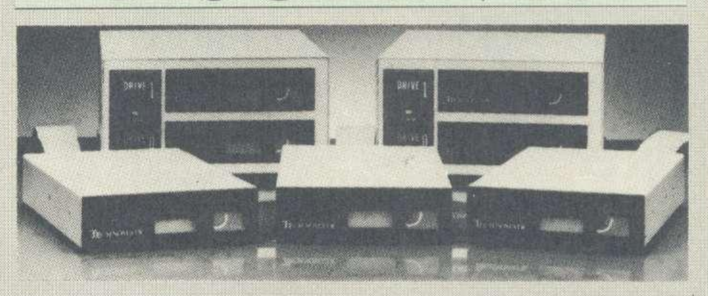
DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected to one dual will allow 8 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers) £135(a)
TDM2 Dual Unit (2 computers) £75(b)

DISC DRIVES



TECHNOMATIC drives are fitted with high quality slimline Mitsubishi mechanisms and represent the state of the art in drive technology. The drives are built to the highest standards and are tested to their full performance capability before packaging.

Single drives are available with or without integral mains power supply. The dual drive power supplies are switch mode type and are generously rated to ensure minimum heat generation even over long periods of operation. All drives with integral power supply are fitted with a mains indicator.

The drives are housed in attractively designed metal casings painted in hard wearing BBC matching paint. The dual drives can be supplied in stacked version or with built-in plinths. The plinth version cases are of sturdy construction to carry any monitor and provide a simple method of having a compact computer installation.

The 80T drives are supplied with the 40/80 track switching modules at no extra charge. The 40/80 track switches are conveniently positioned in the front on dual drives to enable easy switching between the tracks.

All drives are supplied with all the necessary cables, manual and a formatting disc. The mains powered drives are also fitted with a 13A mains plug suitably fused. The drives are ready to be fitted to the computer. All drives are capable of operating in single or double density modes.

Single Drives:			With integral psu:	
1 × 100K 40T SS	: TS100	£85(b)	PS100	£120(b)
1 × 400K 80/40T DS	: TS400	£125(b)	PS400	£145(b)

Dual Drives: (with integral psu)

Stacked Version:		Plinth Versions:	
PD200 2 × 100K 40T SS	£190(a)	PD200P	£215(a)
PD800 2 × 400K 80/40T DS	£265(a)	PD800P	£289(a)

Note: We can supply drives with Shugart mechanisms at considerably lower prices. Please phone for details.

3.5" Drives:
These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives come complete with cables, manual and formatting disc.

TS35 1 × 400K 80T DS £99(b) TD35 2 × 400K 80T DS £175(b)

3M FLOPPY DISCS

Authorised Distributor Data Recording Products 3M

Industry standard high quality discs with guaranteed error free performance for life. Discs in packs of 10:

40T SSDD £13(c)	40T DSDD £18(c)
80T SSDD £22(c)	80T DSDD £24(c)

3½" discs. Pack of ten £38(c)

FLOPPICLENE DRIVEHEAD CLEANING KIT

The FLOPPICLENE drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits. Floppiclene with 20 disposable cleaning kits. £14.50(b)

DISC ACCESSORIES

Single Disc Cable £6(d) Dual Disc Cable £8.50(d)
10 Disc Library Case £1.80(d) 30 Disc Case £6.00(c)
Lockable Storage Boxes 40 Discs £14(c) 100 Discs £19(c)

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RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function, instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.

RB-2 (with 'microdraw'). £52 (b)
RB-2I (with 'icon artmaster'). £60 (b)

AMX MOUSE

This sophisticated mouse has many advanced features such as Icons, Windows etc. The supplied 'AMX ART' is a superb, yet simple-to-use CAD package allowing the creation of amazing graphical designs. A screendump for drawings is included. It can also be used with Wordwise/View to replace the cursor keys. Supplied complete with CAD Package, ROM and full instruction manual. £69 (b)

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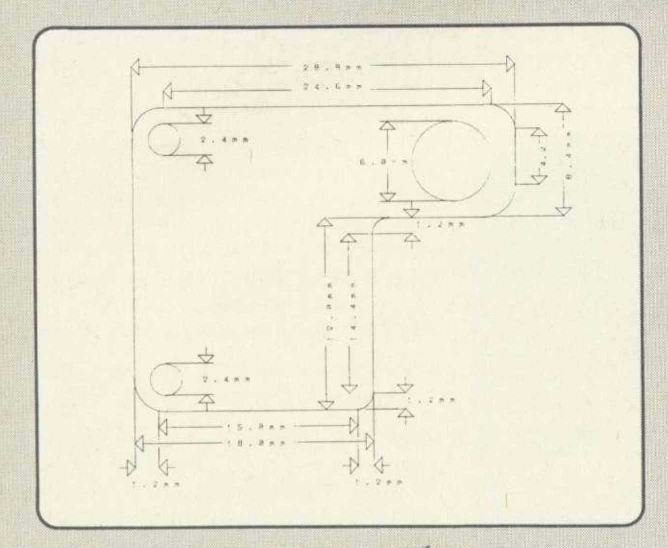
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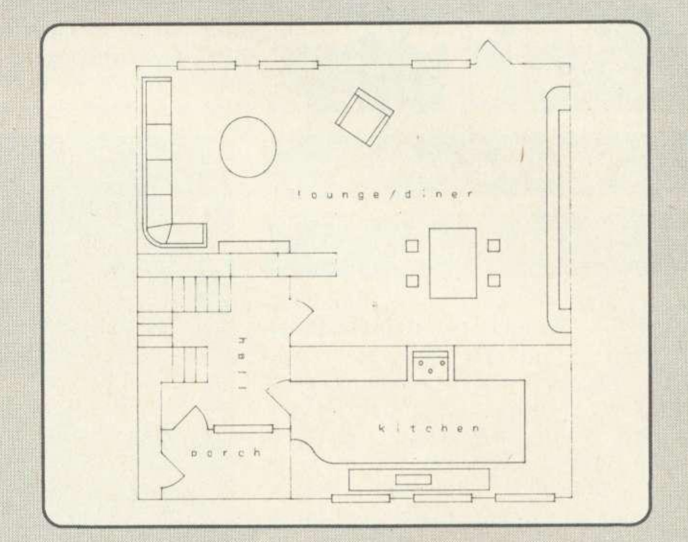
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* An optional plotter utility will allow output to a range of popular plotters for high quality diagrams.
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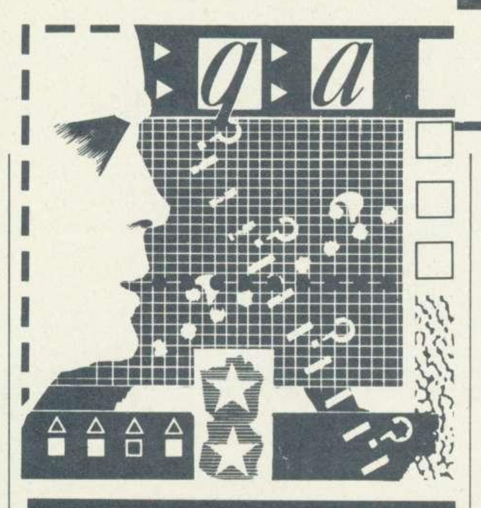
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T E C H N O M A T I C



Martin Phillips reveals what you can't find in the *Wordwise Plus* manual and presents an automatic disc menu program for BBC micros

What the manual misses out

MANY thanks to all those readers who wrote in to point out that there is a way of clearing the text using *Wordwise Plus*. There are now two editions of the *Wordwise Plus* manual (and three versions of *Wordwise Plus*, although Computer Concepts assures me there is little difference between these). Changes are mostly minor, but there are some worth listing. Computer Concepts does not intend to give an update to edition one as, sooner or later, such costs would have to be passed on to you, the customer. Therefore I have compiled a list of changes that I consider important or substantially different plus one or two other points. All page numbers refer to edition one, with the corresponding page in edition two given in brackets (where different). The function keys are given thus <f1>. The second edition can be identified by the inclusion of '2nd Addition 1985' in bold print at the start of the copyright notice (the first bug in the second edition?).

Page 4 Should have mentioned that the hash sign can be used as a wildcard symbol. When entered into the search string (either with option 5 or used from a segment) it will match with any character. If you want to search for the hash sign then use function key f4 to move to the next hash.

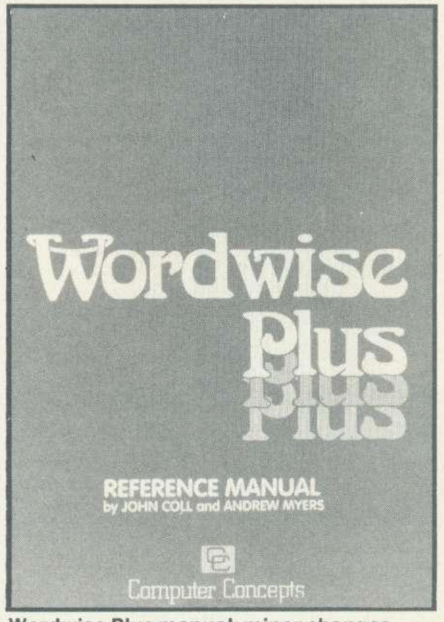
Page 12 (13) Has some text missing. The following should be added:

Special codes representing green and white, etc, may be used within a function key definition. These codes are *not* the same as those used with FIND and REPLACE commands. The codes to be used are listed below:

:!! –represents <f1>
:!'' –represents <f2>
:I –represents TAB
:M –represents RETURN

For instance, to define a key to produce <f1>T15<f2> the sequence would be:

*KEY 1 :!!T15:!''



Wordwise Plus manual: minor changes

Page 13 (14) Says that '<f2> is used to mark the end of a command'. This should read '<f2> or the Return key is used to mark the end of a command'. Putting both will cause a blank line to be printed in the text.

Page 17 Should have a note to say that if a * command is executed and the printer hangs up, then pressing Break will lose the text.

Page 19 Omits a note to say that the default footer can be removed by defining a blank footer:

<f1>DF<f2> RETURN

Page 20 When centring underlined text, it's necessary to separate the underlining command (US) from the centre command with a space to prevent underlining all the way from the left margin. (Daisy-wheel printers that only underline a printed character will not need this.) This makes the underlining command part of the text to be centred. Use the command thus:

<f1>CE<f2> <f1>US
<f2>Centred and underlined
<f1>UE<f2>

Page 26 (25) All the examples given should be followed by Return according to edition two. Similarly for pages 27, 28. However my own experience shows that there must also be a white embedded command at the end if the header or footer ends with an OC statement.

Page 32 The list of TAB stops may not continue over one line.

Page 57 (56) The example should read:

<f1>DF<f2>CE<f2>Section 1–page <f1>PP<f2> RETURN

Page 59 (58) The redefine print sequence has a 50 character memory for up to 10 definitions, not a maximum of five for each definition. Also these definitions can be loaded and saved from the initial menu using:

:SAVE PARAMS "DAISY" RETURN
:LOAD PARAMS "DAISY" RETURN

where DAISY is the name of the file.

Page 62 (63) Here both editions are wrong. <f1>TI10<f2> will only cause text to be placed on the next line if there is already text on that line. Issuing a <f1>TI10<f2> at the start of a line will indent that line 10 spaces and print the text on the same line.

Page 82 (83) It's possible to search for special characters such as green and white using FIND. The codes are:

:G –green
:W –white
:R –RETURN
:T –TAB

Also the wildcard, hash, can be used.

Page 90 (91) a whole page referring to the NEW command is missing here. This command will clear all text from memory, and *Wordwise Plus* will be in the same state as it was on switch on. Obviously it must be used with extreme care, but the text can be recovered by using the technique described elsewhere in this article.

Page 96 (98) All variables in a procedure are treated as global, and not local.

Page 134 A function has been missed out here. The STR$ function converts a number into its corresponding string. For example:

A$ = STR$ (A%)

This is the same as the Basic statement.

Page 168 Should include '*' star command at the end of the list.
Page 171 Onwards has been changed to suit the differing page numbers.

Shadow preview

IT'S possible to make use of the shadow mode to preview long text files in mode 0. This is done by selecting *SHADOW from the menu page then previewing the text (option 7). On returning to the menu page, *Wordwise Plus* will hang up when Escape is pressed to edit the text. All is not lost – if *SHADOW 1 is entered from the menu page, then the text will be restored to normal. All this could be included in a segment to preview the text and then return things to normal afterwards:

```
*SHADOW
DEFAULTS
PREVIEW TEXT
*SHADOW 1
```

To stop the text vanishing when it is displayed, insert a <f1>PA<f2> control code at the end of the text that is to be displayed.

It's not possible to make use of the SHADOW mode to give more text workspace however.

The road to recovery

THERE are 1001 ways of losing text, even with *Wordwise Plus*, so always save your text at regular intervals to avoid losing it all. However, accidents do happen, usually with the most important text – perhaps you typed NEW before saving the text for instance, or pressed Break when previewing the text. You'll be pleased to hear that text can be recovered intact in many cases. Obviously if the dog trips over the mains lead and the computer loses power, then nothing will recover the data. When text is mysteriously lost, the actual text itself has not disappeared but the *Wordwise* pointers are reset by some means and give the appearance of an empty machine. If this happens, don't panic and switch the machine off, simply type:

```
*SAVE "HELP" 1D00 +5000
```

This will then save the actual computer memory to disc or tape. It will start saving at location &1D00 and will save &5000 bytes of memory. Then select option two and load in the file called HELP. Now, as if by magic, all your text will reappear, perhaps with some rubbish at the start and the end, but hopefully intact with all the control codes. The rubbish is easy to delete using the markers and key f7.

The memory locations given above are rather rough and ready, and it's well worth playing around with your own machine to see exactly where in memory the text is stored. This can be done using a program which will examine the contents of memory for you, and these are provided on such ROM chips as *Toolkit* and *Disc Doctor*. If you don't have such a program (they are quite useful), then here is one that can be used from a *Wordwise Plus* segment, or be typed in as a Basic program if line numbers are included:

```
A%=&1900
REPEAT
A$=CHR$(?A%)
PRINT "&";
PRINT ~A%;
PRINT "...";
IF A$ >= " " THEN PRINT A$;
PRINT
A%=A%+1
UNTIL A%=&7C00
```

This can then be called up from the normal menu page by pressing Shift and f0 if the program is stored in segment 0. Each memory location, starting at location &1900 will be searched (depending on the type of machine, this might need changing down as far as &E00). The contents of that location will be printed out as an ASCII character. The IF statement filters out any unwanted control codes. To stop the screen scrolling press Shift and CTRL together.

The length of the file (&5000) might be too long to fit in your machine. This can be tested at switch-on by looking at the characters free – it should be over 20500 to suit a file of this length.

It's worth finding out how the technique works on an unwanted or previously saved file before the actual day of disaster. Keep a note of the start memory location to begin saving from, and the maximum length of file that needs to be saved.

Serving up an automatic menu

I LIKE to have things neatly organised, and always have a menu on a disc so I can easily see what's there, and load it quickly. The menu program I have used for the last couple of years had problems, so I decided to write my own. This one is totally automatic, so once it's on the disc I can add or delete programs without changing the menu program.

I had to work within certain constraints. First, if the menu program was to be totally automatic, then it would not be possible to have a description of the program displayed. At first sight this is a great drawback, but if the filename saved on disc is sensible, then a description is unnecessary. I also wanted a menu that would load or run machine-code programs, and thought it would be useful for the menu to display any files resident on the disc. It's annoying to load in a program, then be asked for the name of a file – at this point you have to break out of the program and catalogue the disc. Also the inclusion of the directory for the files would be useful as I always store certain files in special directories so that I know what they are, eg, *Wordwise* files under the directory W, *View* files under directory V, *EXEC files under directory E, etc. I wanted the menu to tell me whether I was using a 40 or an 80-track disc. (Switchable drives are useful, but it's annoying when one uses both formats.) Also the menu program would have to display those files on both drive 0 and drive 2. Another feature that could prove useful would be a means of easily printing out the catalogue.

Last, having decided on an easy-to-use automatic menu program, it was worth going all the way and having a program that would put the menu onto a disc and do the fiddly things like putting a !BOOT file on and changing the *OPT to run.

This program is simple to use – load the file creation program, enter the title for the disc in question, put that disc in the disc drive, wait a second or two, and the menu is ready to use. There is no need to change directories to identify Basic or machine-code programs, the program will still do this. The TAB key is used to select drive 0 to drive 2, though the prompt message only appears if using an 80-track disc as most 40-track discs are single sided, but this can easily be changed.

The program will display up to 30 files. Two files are taken up by the automatic menu and the !BOOT file, which are not, of course, displayed. Hence it can display all the files resident on one side of a disc. It does not cater for the 62 file options on Watford or other DFSs. Now that the price of discs has dropped so much, this feature is less useful than it was. The program does all this by doing one or two 'naughty' things, hence it will not work with the second processor. However it has been tested on a 0.9 Acorn DFS, a 1.2 Acorn DFS, and the 2.0 DFS of a BBC B+. It will also work quite happily with a Watford DFS, and so, I suspect, with most other DFSs too.

The print facility can be selected by pressing the Copy key instead of

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selecting a program. It has been kept simple to be compatible with a variety of printers.

There are two programs to type in and enter. The first is the Menu creation program which will put the new menu, with title, onto a disc. The second is the automatic menu program itself. The second program must be saved to disc using the filename 'AUTOMNU'. Line 10 of the second program is most important. Type it in exactly as it is with the spaces between the letters. When the program is run, your own title will automatically be placed here.

The menu creation program is quite straightforward. An important part is line 70 which loads the second program, the automenu program itself, into memory starting at location &5000, for two reasons. First, it saves having to keep swapping discs when using a single disc drive, and second, it allows the title to be inserted into line 10 of the program as it is to be saved to the new disc. (This avoids having to save a separate file to disc with the title on it.) Lines 120 to 180 provide some colour on the screen. These can be changed if required. Lines 230 to 310 are a routine to input the title on the disc.

It's rather complicated, but great care must be taken to ensure that it's the correct length to insert into the automenu program. If anything goes wrong here then the second program will be corrupted when it's saved to disc, and will result in the 'Bad program' message. An added complication is the need to allow the Delete key to be used, and to enable the screen display to work correctly. The delete key has the ASCII value of 127.

If using a twin disc drive, then this program could easily be adapted to save the program on drive 1. Change lines 350, 360 and 370 as follows:

```
350 PRINT' "Insert your new disc in"
360 PRINT "drive 1"
370 *DRIVE 1
```

Lines 420 to 470 use the command line interpreter to put the correct *OPT command on the disc, and to create a !BOOT file. Notice all the speech marks at line 450. These are not mistakes, but must be there in order for a set to be printed round the filename. Line 480 pokes the title into the memory location which is where line 10 of the automenu program has been loaded. It also follows it by a return character, which would then corrupt the program if it was left there, therefore this is overwritten by poking a space into that position in memory – it does actually work! This technique could be adapted to insert data into a program skeleton, etc.

Last, the automenu is saved. The program length +C00 is longer than required, to allow for extra spaces or extensions to the automenu program itself. If this is adapted and extended, then check its length using *INFO, and increase this figure accordingly.

The command line interpreter procedure at lines 560-610 has been included for all those users with Basic 1. Basic 2 users might prefer to use the simpler OSCLI command that is available to them, but it makes little difference. There is an error routine at lines 630-690. If Escape is pressed, then the screen is cleared and the program ended, otherwise the error is printed and the program restarts. The sorts of errors that might occur include unformatted or write-protected discs, etc.

The automenu program itself is much more complicated. What the program does is use the OSGBPB call to load in something to memory. As it is doing this, it also puts the first two sectors of the first track into memory locations &E00 and &F00. These first two sectors contain the filenames and execution addresses of the files resident on the disc in exactly the same format as they are on the disc sector. Various other bits of information are present on the disc too, including the total number of tracks on the disc. This could also have been achieved by switching off the screen, using *CAT and switching on the screen again. This works with the Acorn DFS but not with such things as the Watford DFS. The filenames are stored in page &E00, and the execution addresses in page &F00.

Most disc handbooks give the structure of the catalogue sectors of a disc. It would have been possible to use the disc title that is stored on disc, but this would limit the user to a title only 12 characters long, whereas up to 30 characters can be inserted by the method described above.

Line 10 holds the screen title. The title given in this listing has only been included to simplify correct entry. It will be changed by the first program to your own title. It can of course be edited by simply listing the line and changing it, then resaving.

PROCinitialise sets up the variables needed for the program, provides DIM space, and calls up the routine to transfer the disc catalogue to memory. Then the number of tracks on the disc can be determined, and the actual drive in use can be found in location ?&1046.

PROCsetscreen formats the screen display. Again the colours can be changed to suit. Basic programs are displayed in red, machine-code programs in magenta and files are displayed in yellow. Lines 380 to 580 print out a catalogue first of the programs, and then of the files. This catalogue will not show the !BOOT file or the automenu program.

Line 400 has been included to stop the prompt to press TAB to see drive 2 being displayed. (It does not disable the facility though.) If you have a double-sided 40-track drive, then leave out line 400. Lines 600 to 780 allow any of the programs to be chained, *LOADed or *RUN, and a printed copy to be obtained. Care has been taken to ensure that the appropriate message is displayed at the bottom of the screen, depending on the number of programs or files on the disc.

DEFPROCcat (lines 800-879) reads the catalogue sectors into memory. The number of catalogue entries multiplied by eight is given in location &F05. The routine then checks the execution addresses for each catalogue on the disc, if the middle order bit is 0 or &FF then the program branches to the PROCcatfile, otherwise it branches to PROCcatprogs.

PROCcatfile stores each file on the disc in the array file$. It also stores the directory. The MOD 128 is necessary as values above 128 indicate that the file is locked. The !BOOT file is not stored in the array but ignored. PROCcatprogs performs a similar task for the programs detected. There are two arrays – dir$ and prog$, dir$ saves the directory and prog$ the program filename. The directory needs to be saved so that before the program is chained, the directory can be changed to suit, when one program chains another. Also line 1120 checks for screen dumps and does not put them into the array. Of course AUTOMNU itself is not catalogued. Lines 1180 to 1270 are the error routine. Drive 0 is automatically selected to avoid an endless loop if side two of the disc is not formatted. PROCend ends the program tidily should there be no programs on the disc. PROCcopy is the routine to print a hard copy of the catalogue. It has been kept simple to work on most printers, but it could be embelished as required.

You'll find the automatic menu listings on yellow pages 97-98

IF YOU have a technical hitch or a programming problem let Martin Phillips give his diagnosis. We'll pay £5 if you raise a really interesting point. Please give full details of the system you're using and include a listing where appropriate, making your question as specific as possible. WRITE TO: Hints & Tips, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

STYLE COUNSEL

Tessie Revivis advises on presenting listings

You may have noticed that over the last six months or so the listings presented on the yellow pages of *Acorn User* have adopted a certain style. We hope this has made them easier to read, understand and, perhaps most important, type in!

The following notes are intended to provide a brief outline of the style adopted. They have been compiled with the co-operation of the BBC and we hope that you will adopt them in an effort to produce a standard style of listing. Of course we expect all programs submitted to *Acorn User* to conform to our style.

These notes are by no means conclusive, and readers comments and feedback are most welcome. Please mark any such correspondence 'Program Style'. This month's notes cover presentation of Basic listings, next month we will deal with assembler.

General

Programs must be written in Basic 1. The only exception is if the program is a Basic 2 tutorial. The Basic 2 EQU and OSCLI functions can be simulated in Basic 1 using FN's. Details of how to do this appear on page 46.

Program listings should be provided with line numbers incrementing in steps of 10, starting from 10, and line numbers should run consecutively.

The first five programs lines must begin:

```
   10 REM Program Title
   20 REM Author's Name
   30 REM BBC B/B+/6502/Basic1
/OS>1.0/Electron
   40 REM (C) Acorn User month
 year
   50 :
```

Try to keep the program title to 30 characters. Line 30 should be as specific as possible, eg, if the program requires discs, say so. Will it run on all OSs or the 6502 SP? It should be clear at a glance whether a program will run on a particular system. REM statements must use upper and lower case letters as illustrated above. Keep REMs to a minimum, and place the REM above the line it concerns rather than at the end of the line. Multi-REMs should only be used in programs of a tutorial nature.

If the program expects PAGE to be set to a specific value then the program should check for this – and produce an error message if it is not, eg:

70 IF PAGE< >&1900 PRINT "Page error":END

As a rule programs should aim for the highest Page setting to ensure maximum compatibility. The golden numbers are:

&E00	Cassette Page
&1100	Disc (no files) Page
&1200	Net (no discs) Page
&1900	Discs standard Page
&1B00	Net + Disc Page
&1D00	Electron ADFS Page
&2400	Disc and Teletext Page

Do not use blank lines to separate sections of code – use a colon line as indicated in line 50 above.

Listings should not be indented as this confuses the inexperienced and makes them difficult to print. If you wish to examine a listings structure then use LISTO.

If a program is non-hardware specific and should run on an Electron please use mode 6 in preference to mode 7 for any title pages, etc.

All variable names should be lower case, unless the resident integer variables are being used. They should be chosen to reflect the function they are performing and kept as short as possible. Do not include numbers and, where possible, do not underline ("_") characters.

Do *not* use the variables I, I%, i, i%, O, O%, o, or o%. O% may be used in Basic 2 tutorials in its phantom assembly role in conjunction with P%.

All constants should be assigned to a variable.

Avoid multi-statement lines longer than 40 characters. Break listings into extra lines where possible. If long multi-statement lines are needed (eg, in the case of IF..THEN..ELSE sequences), try to restructure as a procedure or function.

The end of the main program must be marked with END and a colon line, eg:

```
550 PROCtext
560 UNTIL doomsday
570 END
580 :
590 DEF PROCmenu
```

Do ensure that your program is well structured. Multi-statement lines can be avoided by incorporating them into a procedure. The main program should be as short as possible, followed by function definitions, procedural definitions and, finally, any data lines.

Leave a space between a command and any parameters it requires, eg:

90 SOUND 1, –15,100,100

rather than:

90 SOUND1, –15,100,100

and

Simulating ON GOSUB

Patrick Quick described how functions can be used to simulate ON GOSUB type structures in the May 1985 *Acorn User*. Here's a brief resumé of his technique.

The listing below shows the technique involved. Here you are requested to enter a number, namely 1, 2 or 3. The appropriate FN will then be called and its number printed. If you enter any other number the result will be false and the string after the ELSE in line 70 will be printed.

```
   10 REM Simulating ON GOSUB
   20 REM by Bruce Smith
   30 REM for BBC B/B+/6502/Electron
   40 REM (c) Acorn User September 1985
   50 :
   60 INPUT "Enter 1,2 or 3 :"X%
   70 IF FNnum("one,two,three",X%) ELSE
PRINT "I said 1, 2 or 3!"
   80 END
   90 :
  100 DEF FNnum(A$,A%)
  110 IF A%<1 OR A%>3 : =FALSE
  120 LOCAL M%:M%=0
  130 REPEAT
  140 A%=A%-1
  150 A$=MID$(A$,M%+1)
  160 M%=INSTR(A$+",",",")
  170 UNTILA%<1 OR M%>LEN(A$)
  180 IF A%>=3:=FALSE
  190 =EVAL("FN"+LEFT$(A$,M%-1))
  200 :
  210 DEF FNone
  220 PRINT"This is function ONE"
  230 =TRUE
  240 :
  250 DEF FNtwo
  260 PRINT"This is function TWO"
  270 =TRUE
  280 :
  290 DEF FNthree
  300 PRINT"This is function THREE"
  310 =TRUE
```

100 MODE 5

rather than

100 MODE5

All brackets are significant and must be included, eg, use:

CHR$ (224)

not

CHR$224

Do not use embedded control characters, use the CHR$ alternative.

Do not use abbreviations in listings, especially star commands, eg, *DISC instead of *D., *ACCESS instead of *AC., to reduce possible conflict with other ROMs.

Avoid using the top and bottom lines of the screen for displaying text and use paged displays rather than scrolling ones.

Keep flashing text to a minimum, unless for a specific purpose such as a prompt, eg:

"Press SPACE to continue"

Do not include instructions as part of the program, provide these on a separate sheet with your documentation, or as a !BOOT file.

Use function keys to select actions wherever possible, and provide a suitable key strip – this is especially important in graphics programs.

Do not protect programs in any way. For example, the CTRL-Break keys should not be protected to re-run or hang up the micro. It is pointless with listed material and only confuses those who are beginners.

The Escape key should always return the user to any menu present, where there ought to be an option to quit the program.

Upper and lower case characters should be recognised on all single key input.

If programs take time to initialise or process data, a suitable prompt informing the user of the fact should be printed, eg:

"Please wait – processing data"

If the program is of a tutorial nature a suitable and practical demonstration in the form of a PROC or program should be included.

If memory is tight envelopes, key definitions, user defined characters, integer variables, etc, should be set in a 'loader' program.

Use only legal OS calls – no peeks or pokes.

Procedures and loops

All PROC names should be lower case, for instance, PROCtest or PROCmenu. This is especially true for PROCoscli, as Basic 2 will tokenise an upper case PROCOSCLI!

All procedural definitions should have a space between DEF and PROC:

1000 DEF PROCmenu.

Procedural definitions should be separated by a colon line, eg:

1020 ENDPROC
1030 :
1040 DEF PROCtime

If embedded loops are being used, a new line should be used for each FOR statement. Similarly put all corresponding NEXT commands, including variables, on a new line, eg:

610 NEXT A%
620 NEXT B%
630 NEXT C%

Very short loops, eg, delay loops, may be kept to a single line, thus:

500 FOR D% = 0 TO 500:NEXT D%

Printing

Do not break words when arranging PRINT statements to keep to 40 characters width, eg, use:

100 PRINT "I read Acorn User each ";
110 PRINT "Month without fail"

rather than

100 PRINT "I read Acorn User each mon";
110 PRINT "th without fail"

Use the SPC(x) command instead of inserting spaces with the quotes of a PRINT line, eg use:

210 PRINT SPC(6);"HELLO!"

rather than

210 PRINT "   HELLO!"

GOs

GOSUB and RETURN should only be used in the instance of the ON. .GOSUB sequence, but avoid if possible.

Use of GOTO should be restricted to the ON. .GOTO sequence. All destination lines should be suitably REMed. In virtually all instances a GOTO can be replaced via a simple function.

Refer to the box on the preceding page or Patrick Quick's article in the May issue of *Acorn User*.

Data

DATA statements should be grouped together at the bottom of the listing. Each DATA line should be a maximum of 40 characters – use a new line if you have to.

A suitable checksum procedure should be included to check the validity of the data.

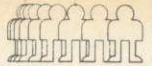
Destinations of RESTOREs should be marked with a suitable REM, as should all new areas of data.

Error checking should be performed on all DATA inputs.

Next month Tessie shows how to present assembler listings

```
 10 REM Simulating Basic II from I
 20 REM by Bruce Smith
 30 REM for BBC with Basic I
 40 REM (c) Acorn User August 1985
 50 :
 60 FOR pass=0 TO 3 STEP 3
 70 P%=&C00
 80 [OPT pass
 90 LDX #0
100 .loop
110 LDA base,X
120 JSR &FFE3
130 INX
140 CMP #13
150 BNE loop
160 RTS
170 .base
180 OPT FNequb(&7)
190 OPT FNequw(&4341)
200 OPT FNequd(&204E524F)
210 OPT FNequs("USER")
220 OPT FNequb(13)
230 ]NEXT
240 CALL &C00
250 PROCoscli("HELP")
260 END
270 :
280 DEF FNequb(byte)
290 ?P%=byte
300 P%=P%+1
310 =pass
320 :
330 DEF FNequw(word)
340 ?P%=word MOD 256
350 P%?1=word DIV 256
360 P%=P%+2
370 =pass
380 :
390 DEF FNequd(doubleword)
400 !P%=doubleword
410 P%=P%+4
420 =pass
430 :
440 DEF FNequs(string$)
450 $P%=string$
460 P%=P%+LEN(string$)
470 =pass
480 :
490 DEF PROCoscli(A$)
500 DIM X% 256
510 Y%=X% DIV &100
520 $X%=A$
530 CALL &FFF7
540 ENDPROC
```

Listing 1. Simulation program to enable programs written in Basic 2 to run on BBC micros fitted with Basic 1. To find out which version you have, switch on the machine and type REPORT – Basic 1 will respond with '1981', Basic 2 with '1982'



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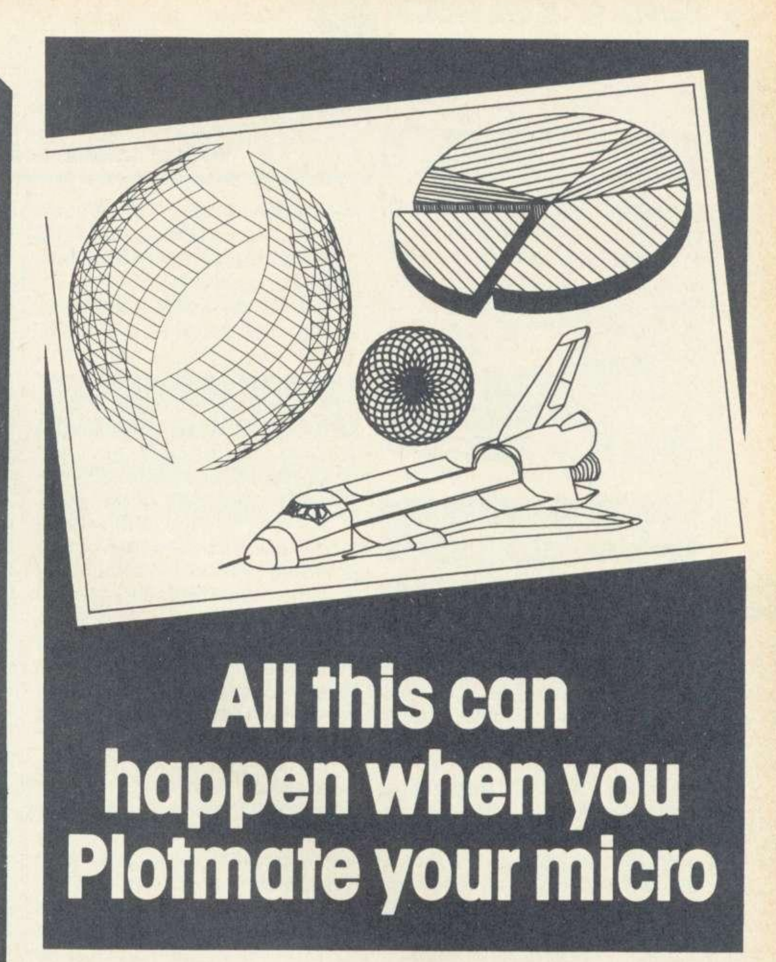
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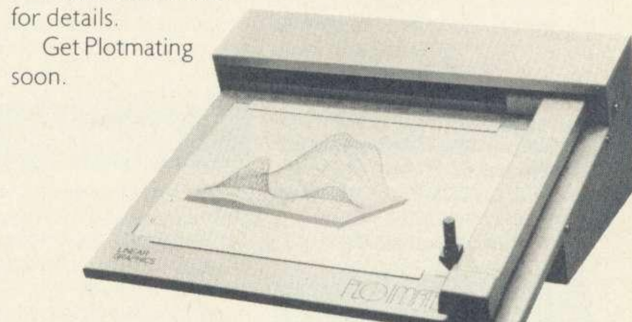
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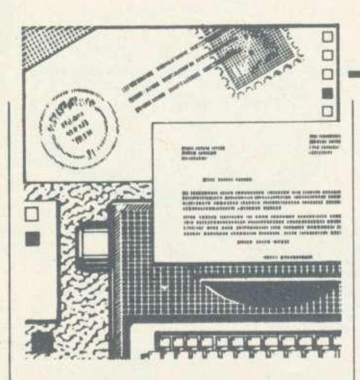
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Write to: Letters, Acorn User, Redwood Publishing, 68 Long Acre, London WC2H 7ED

On the side, on the cheap

Sir, At last a magazine that recognises the true power of sideways RAM. I have been using it for over a year, after discovering a project in *Electronics and Computing Monthly* (March '84) which made it possible to plug a 6116 chip (costing about £4) into a sideways ROM socket. This article refers to a 6116LP-2 chip, but as this is sensitive to static electricity which destroys it, I recommend a 6116E2, which is buffered. This is a good introduction to sideways RAM and not very expensive.

Now I'm ready for an upgrade to 16k!

I expect that you will be concentrating on utilities with a star (* command), but an article explaining how to develop and write a language would be welcomed. I'd also like to correspond with other sideways RAM owners who can write to me at the address below. Finally, I'd like to say I'm glad I read *Acorn User*, it's great!!

P M Schrama
Bontekoekade 28
2516 LB Den Haag
Netherlands

Thank you for your kind comments. As the sideways RAM feature has been well received we will certainly be carrying more articles on the subject in the not too distant future.

Small is beautiful

Sir, Let me say that June's issue has given one of the best reads for some time, but with the problems at Acorn it's about time consideration was given to the user.

If a computer was specified properly and sold at the right price, it would have a career like the venerable Volkswagen – who needs 16 or 32 bit, and for that matter CP/M, Fortran, Cobol or what have you?

It's all very well accommodating the biggest and best, but do our schools and small businesses need vast number crunching capabilities. Surely our schools should be catering for the 80 per cent of small businesses, not the large concerns geared to other systems.

It's nice to know that people like Nick Evans are attempting to grasp the nettle (although by now he must realise they have a tendency to sting). There is a lot of truth in what he says, but he presents his case like a closeted school teacher who has forgotten what the real world looks like.

It's about time the question was asked 'Who wants to use a micro and what are their requirements?'. For my money, small business must be the largest sector and the BBC B micro together with it's peripherals meets most of the criteria. The only drawback is the limitations imposed by the lack of RAM, necessary for integrated programs, such as those for annual audits.

Come on, Acorn, let's have an upgrade to 256k of user RAM sold at BBC B prices. Don't let market trends force your prices down – get them right from the start – the Japanese are hard on your heels. Stabilise the market. Let the schools know they have invested wisely. Give the programmers a chance and, who knows, by producing a people's micro and using the principles so readily grasped by Henry Ford, a bright future could be had by all.

A A Hatley
Surrey

Monitored

Sir, A few months ago Martin Phillips answered a letter from Mr Wilson who wanted to change a normal TV set into a monitor.

In the November '84 issue of the electronics magazine *Elektor*, there was an article on just this topic which may be of help.

J N G Tummers
Weert
Netherlands

Back issues of *Elektor* cost £1.50 including postage and are available from 10 Longport, Canterbury, Kent CT1 1PE.

An expanding concept

Sir, We must reply to some of the comments made by Chris Drage in his review of Concept Keyboard software (June '85).

It's difficult to understand the basis for the comments in his concluding paragraph. The Concept Keyboard overcomes many of the problems and restrictions of the qwerty keyboard, as well as opening up a range of imaginative possibilities. If software was developed to be used with or without the Concept Keyboard it could not fully exploit the advantages offered by it.

The MEP Low Attainers Project has produced a number of software packages which, as far as possible, avoid using the qwerty keyboard, such as *Rescue* and *Supermarkets*. There is also an excellent wordprocessor called *Prompt*, which uses the Concept Keyboard, available from the MEP Special Needs Software Centre. These, and an increasing number of other programs, gain tremendously by fully using the advantages of the Concept Keyboard.

I'm sure that if Chris Drage was to try these programs, or any others which exploit the Concept Keyboard fully, then he would see it as a valuable tool in its own right.

Phil Bennington and Ann Muxworthy
Project Co-ordinators
MEP Low Attainers Project
Newcastle

Chris Drage replies: Here here! When I submitted my article in January programs making full use of the Concept Keyboard were thin on the ground. Since then I have been able to assess several which do so and can now modify my previous comments.

Two adventure programs for children *Rescue* (Star Devices) and *Dragon World* (4mation Education Resources), illustrate the points in the letter. The former is an entirely Concept Keyboard based adventure where children move their 'character' over a superb, multi-coloured overlay in an attempt to rescue a prince locked in a castle. My class of average to bright 10-year-olds voted this adventure the best yet!

Mind you I haven't let them loose on *Dragon World* yet, which utilises a number of overlays relating to specific locations in the adventure. This frees the computer memory from graphics and enables the children to interact with, and physically move about the location via the Concept Keyboard overlay. Full reviews of these excellent programs will appear in future issues of *Acorn User*.

Only by publishers recognising the potential of the Concept Keyboard will its imaginative possibilities be realised. I would like to draw teachers' attention to the 'free' software available through their local MEP centre. *Prompt–2* and *Touch Explorer* are excellent examples of how the Concept Keyboard can meet the needs of infants and low attainers. However, until input devices like the Concept Keyboard become the standard for all micros, there must come a time when each child will have to learn to cope with the standard qwerty keyboard.



Concept Keyboard: as more software becomes available its value in schools increases

Hong Kong connection

Sir, Having read the interesting articles on the Times Network for Schools (TTNS) and the Midland Bank and Bank of Scotland home banking schemes (*Acorn User*, June), we would like to contact either of the banks or Gordon Jones who heads the TTNS scheme.

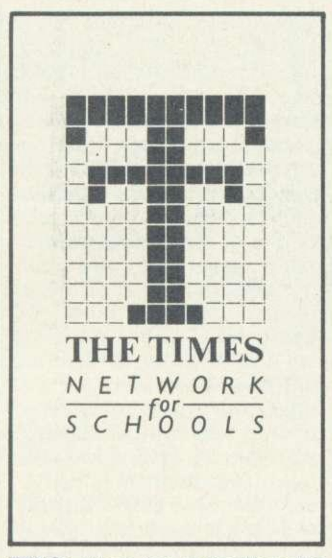
Our school has some 18 BBC B micros and an Econet system, and we are convinced that the British Forces children studying with us while their parents are serving abroad would benefit from any written or disc-based information available to them on banking and networking in the UK. We would be grateful for any assistance you can offer us here in Hong Kong.

Robert M Dunn
St George's School
BFPO1

Geoff Nairn replies: The Times Network for Schools (TTNS) is a UK electronic mail system which also carries a database of information for schools. TTNS tells *AU* that there are plans to extend the network overseas via satellite links, and overseas schools that would like to know more should get in touch with TTNS at 200 Grays Inn Road, London WC1X 8EZ, England.

The Bank of Scotland Home Banking service lets its customers pay bills and transfer money electronically using a viewdata terminal. Write to the Bank of Scotland, PO Box 12, Uberior House, Edinburgh EH1 2JF, Scotland.

The Midland Bank's version of home-banking is a pilot scheme at the moment – and has been for some time.



TTNS: plans for extending the network overseas

Econet frustration

Sir, I have been a user of the Acorn Econet system, in one of its various forms, for the past 18 months. In that time I have become increasingly frustrated by the lack of hardware and software support. I can honestly say that I have only ever seen two advertisements for software specifically written for Econet, namely *Discovery II* and *Supervisor*. Isn't it time that software houses, including Acornsoft, applied their expertise to this expanding area?

The frustrating process of obtaining a Winchester hard disc drive for use with an unmodified Econet system has, on occasion, caused me to resort to minor tranquillisers for solace.

Each month companies advertise hard disc systems for the Econet, promising level 2 fileserver compatibility. On receipt of their literature, however, it seems that only Pace, GSL and Torch (who have each developed their own networks around modified Econet hardware) are actually in a position to supply the goods they advertise.

I find it incredible that companies are permitted to advertise goods knowing full well that the services they offer cannot be provided within a reasonable time.

While I am fully aware that a delay of some two to three months often does exist between receipt of advertisements and their publication, it is obvious that certain companies are using highly questionable advertising tactics to lure trade away from the more scrupulous businesses, who are, thankfully, in the majority.

Finally, if there are any users of an unmodified Econet system who have actually got a hard disc system up and running under either level 2 or level 3 fileserver software, I would be very grateful for any advice you can offer.

Joe Arrowsmith
Chairman
Computer Club
St George's Hospital Medical School
London SW1

Setting the record straight on colours by interrupts

Sir, Following my two articles (*AU*, April and May), several points have arisen which I'd like to set straight. The first is a simple one – due to a small typographical oversight in the first article all line numbers mentioned that were less than 10000 were out by 50 (ie add 50 to them in the text). This makes no difference to the operation of the program but does clarify the article somewhat!

The second point also relates to the first article and was raised by a reader who was having difficulty carrying out my suggestion regarding chopping out sections of code not relevant to the mode currently in use. I'm not sure of the exact problem but the only possible source of trouble I can find is failure to select the required mode before calling PROCsetdlis. This procedure reads the current mode (at line 10010) and assembles code accordingly. Thus if the ON. .GOSUB at line 10340 has been left but sections of code removed, an incorrect mode on entry will cause an error. The best method is to alter line 10340. For example, if you wanted only to use the routine with a four colour mode (eg mode 1), look for the four colour routines (lines 10570 to 10660) and amend line 10340 as follows:

```
10340]:GOSUB 10570:[OPT Pass
```

Lines 10490 to 10560 and 10670 to 10740 can then be deleted. This makes the mode selected when PROCsetdlis is called irrelevant and line 10010 can also be deleted.

The final point regards a slight slip in the printing of the second article. The program description (third paragraph of the third column, page 81) should read as follows:

This brings us to the program. The first 106 lines are for demonstration. They set up the DLI routine data areas to display mode 0 followed by 1, 2 and finally 3 (or mode 4 followed by 5 and 6) with each mode having its default colours selected.

PROCsetdlis is then called before assorted demonstration procedures, one for each mode. The only vital sections of these procedures are 'PROCmode' (lines 350 to 620) and its associated data (lines 1040 to 1100) because this is used to allow the standard operating system VDU routines to function correctly: it fools the OS into thinking that it is in whatever mode you have selected. Remember when using this in your own software that the RESTORE at line 390 will need to be altered!

Then the following sentence should be added to the second paragraph on page 83 (after 'if selected):

Note that it is these values that need to be altered if you want to change the palette – don't use VDU 19 as it won't work. Thus to change the foreground colour for a two colour mode, alter the second byte of this block of data.

This description matches up with the listing and photograph as published. The description of PROCmode also renders the second paragraph of the article irrelevant as it allows you to use the existing MOS routines rather than having to write your own.

Tristram Mabbs
Kent

Do not adjust your set

Sir, The reply to A Sinclair (Dear Kitty, June 1985) contains an error regarding the BBC Data Recorder (assuming model No. ANF-03). In play mode, it's unnecessary to adjust the volume control as the signal levels are independent of it – it's used only for audible monitoring

Another cause of 'DATA?' messages is the Azimuth of the play head. The majority of tapes load successfully, but for some the alignment of the play head must be adjusted (usually carried out by your dealer).

I think the problem is the original recording of the tape being out of tolerance – a problem I have experienced myself. Out of 40 tapes, two would only load after altering the Azimuth, then returning to the original setting.

Vic Taylor
Cheshire

Margin notes

Sir, I have a Sanple Daisy Step 2000 printer and as predicted in your review (June '84) I am confused by the tatty multi-language 'manual'. In particular I am unable to set the margin (ESC L(n)). If you could decipher this and other useful sequences I would be very grateful.

John Chapman
Lancs

George Hill replies: The set left margin feature is, like mcst others, governed by an escape sequence. This has to be sent to the printer only.

To set the left margin n characters from the leftmost position send the sequence ESC L n which may be done in a number of ways:

1) From the keyboard type:

VDU2,1,27,1,ASC"L",1,n,3

(note that n is a number between 0 and 255).

2) From Basic, the same line inserted anywhere in a program will have the desired effect. You can omit the initial 2 and the final 3, which enable and disable the printer, if these are taken care of elsewhere.

3) From a wordprocessor. This is awkward in *View* which is not flexible in this respect, but in *Wordwise* use <green> OC27,77,n <white> where n is again a number between 0 and 255.

Using a wordprocessor it's probably easier to leave the left printer margin unset, and to set the left margin in the wordprocessor, eg, by an LM command.

Pinning down a problem

Sir, As a long standing Beeb user, who applies the magic box to a wide range of business applications, I would like to share a recent experience with your readers.

When my system was upgraded to twin 40/80 discs immediate and serious problems arose, particularly with my database *Starbase 2*. As my computer had been working with a disc for over a year, and contains the usual complex of ROMs and plastic where does one get advice? In this case after very substantial assistance from both Technomatic and GCC (Cambridge) the problem was tracked down to a damaged pin number one on my DFS ROM. This, quite frankly, was a surprise, because most people are adamant that pin one does not matter.

Moral – buy your system from a responsible supplier and, of course, always expect problems whenever the system is changed!

C Brunning
Lincs

RIP BBs?

Sir, I am writing to you about bulletin boards, as I think the new OBBS Bulletin Board software by Pace is going to put an end to this great hobby.

I'll explain. I started to run a bulletin board, (NOBBS-1 North Oxfordshire Bulletin Board running from 6 to 7pm every weekday on (0295) 720812, about a year ago, and since then quite a few people have phoned me. Some liked it so much that they would phone on the dot of 6 and chat for hours, but then they decided to set up a board of their own and, I never heard from them again.

I feel a lot of us SYSOP's are in this position, and soon everyone will be one! Then we'll all be sitting at home with our new systems set up waiting for our first caller of the day and no one will call, because everyone is waiting for everyone else to phone them!

Putting this OBBS Software at £21 is just too low. Like the TBBS systems, it should be at least £200 to make sure that only the people who really wanted to become SYSOP's would do so.

Alec Crawford
Oxon

Latest round-up of games high scores

Aviator	Acornsoft	30,450	**P Hopgood***
Android Attack	Computer Concepts	1,495,105	**Tim Hedger**
Arcadians	Acornsoft	98,020	**Niaz Islam**
Battletank	Superior	108,500	**Stephen Corcoran**
Chukkie Egg	A&F	30,275,420	**Stephen Corcoran***
Crazy Painter	Acornsoft	279,790	**Richard Arundale***
Cybertron Mission	Micro Power	715,960	**Niaz Islam**
Fortress	Pace	129,250	**Stephen Corcoran**
Frak!	Aardvark	20,000,200	**Paul O'Malley**
Free Fall	Acornsoft	5,024	**Philip Comber***
Hopper	Acornsoft	52,422	**John Durrans**
JCB Digger	Acornsoft	131,450	**Stephen Corcoran**
Killer Gorilla	Micro Power	836,475	**Stephen Corcoran**
Meteors	Acornsoft	498,500	**P Ludgate***
Missile Control	Gemini	469,225	**Ian Boffin***
Monsters	Acornsoft	283,000	**Stephen Corcoran**
Mr Ee	Micro Power	685,650	**Jonathan Parker**
Moonraider	Micro Power	642,125	**Stephen Corcoran**
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Pengo	Watford	230,310	**Tony Smith***
Planetoids	Acornsoft	3,186,450	**Stephen Corcoran**
Pole Position	Atari	384,250	**Niaz Islam**
Rocket Raid	Acornsoft	161,460	**Roger Austin**
Snapper	Acornsoft	1,150,790	**Niaz Islam**
Space Adventure	Virgin	4,890	**Mark Bradshaw***
Starship Command	Acornsoft	8,420	**Ian Boffin***
Zalaga	Aardvark	23,460,500	**Ian Boffin***

** Scores unbeaten since June*

Please say whether your score was notched up on a BBC micro or Electron when sending in your games high scores, as in future issues we'll be publishing separate tables for each micro.

Battling with the big boys

Sir, Nick Evans' timely article 'Publishers "won't touch" school software' has prompted a few thoughts.

Low quality software is all too common – and not just 'amateur' products. My school recently ordered a copy of a 'Weather' package from a well known educational publisher, to discover in the small print that it would only run on a 0.1 OS machine!

The dilemma for the large software publisher is that of turnover. Expensive advertising, packaging and distribution push the distributor into areas in which large sales can be anticipated. The result is the current range of products for the primary sector and those for the larger areas of secondary and tertiary education.

But how can we expand the use of computers in other parts of the curriculum without relevant software? The answer can be found in the output of that small band of publishers working in specialist areas (in this company's case the physical sciences). Our products have been developed *in* schools and thus make use of appropriate user-friendly structures and provide practical error handling.

My company's problem is that of recognition. It failed to gain a mention in your recent Education special. The heavy advertising overhead of the 'big boys' seems to swamp we minnows to the detriment of us all.

Our free catalogue is available on receipt of an sae, from 43 St John's Drive, Clarborough, Retford DN22 9NN or alternatively your local MEP Regional Information Centre has details together with demonstration copies.

G A Herdman
Retford

The Small ads pages were created for companies such as yourselves. Obviously demand and recognition for the product spreads from there, usually by word of mouth. As for us favouring 'the big boys', the omission of products from companies such as Mirrorsoft and Acornsoft from our Educational Software Guide (*AU* May), must surely destroy that impression.

PROGRAM · UPDATE

As if the programs in *Acorn User* each month were not good enough already, many of you have been sending in improvements! Not that we mind, of course, in fact we are going to encourage you to do just that, by printing a selection of the best! So please send in your improvements, mark your letters 'Program update' and send them to the Technical Editor.

The full dotfill

THE colour fill program by Peter Sandford in the January issue provoked much correspondence. Peter has come up with a couple of modifications to ensure that the fill routine will work correctly in all circumstances. The following two lines should be added to the main DOTFILL listing (listing 2, page 112):

```
1915 BNE t1nteq:CLC
:.t1nteq
2085 BNE t2nteq:CLC
:.t2nteq
```

Note that these lines should be changed after the original listings have been entered and debugged, otherwise the checksum generated will be incorrect. Line 90 should therefore be deleted before assembling the amended code.

The following two lines should be modified in the Basic listing of the fill routine (listing 1, page 112):

```
300 IF rightx>tox'
newx=FNback(tox+xste
p,y-ystep):IF newx<=
rightx PROCqueue(new
x,rightx,y-ystep,-ys
tep)
310 IF rightx<tox
newx=FNback(rightx+x
step,y):IF newx<=tox
PROCqueue(newx,tox,
y,ystep
```

Speed painting

BERNARD Emblem of Bury says that Rob Fenton's *Paintbox* program (February 85) has proved to be his most used program since *Chuckie Egg!* Bernard has supplied some adjustments. The [and] keys are used to increase and reduce the speed of the cursor. To get this to work correctly on the Electron change the following two lines to:

```
390 IF INKEY -82 AND
IC%>4 IC%=IC%-4
500 IF INKEY -68 IC%=
IC%+4
```

This will allow the cursor speed to be increased with F (fast) and reduced with S (slow).

The cursor draws rather slowly which is annoying when a large distance needs to be covered. The following line will give a burst of speed when Shift and : are pressed together:

```
595 IF INKEY -73 AND
INKEY -1 IC%=64
```

Colourful messages

PATRICK Fisher of Rickmansworth has sent in a useful improvement to Jeff Tullin's *Bulletin Board* program in the May issue. Patrick has adapted the program to be displayed in colour – just add/change the following lines to the original program:

```
125 *FX19
127 PROCcolour
1450 LDA #ASC(CHR$2
55))
2470 DEF PROCcolour
2480 FOR Y%=0 TO 24
2490 VDU 10,13,130
2500 NEXT Y%
2510 VDU 28,1,24,39
,0
2520 ENDPROC
```

If you change line 300 to read:

```
300 COL$=CHR$(129)
+CHR$(157)+CHR$(134)
+CHR$(141)
```

you will then have cyan text on a red background with green scrolling letters!

Many of you have asked how to slow down the program display and reduce the associated jitter. I have my own solution – first delete the following lines:

```
DELETE 1640,1710
DELETE 1890,2280
```

and add the following lines:

```
571LDY#4
572.delay TYA
573PHA
574LDA #19
575JSR osbyte
576PLA
577TAY
578DEY
579BNE delay
```

By adjusting the value loaded into Y at line 571 the display can be slowed almost to a stop.

Electron-ic keyboard

A COUPLE of changes to the listing in Paul Beverley's programmable keyboard article (March 1985) have been provided by A Patton of Grimsby to allow the program to function correctly with the Electron and Plus 1. Line 470 in listing 1 should be changed to:

```
LDA &2FC
```

this then gets the ADVAL value from the correct location.

Advanced driver lessons

DR HOCK of the University of Leeds was suitably impressed by George Hill's *View* printer driver generator (June 85), but has, nevertheless, been able to make a number of small improvements. His listing can be found on the monthly cassette; the improvements are:

- Inclusion of a pad facility
- Recognising that the multi-highlight facility requires only a single byte in the table (set to &FF). This function has been transferred to HT 143, and therefore caters for 14 full highlights plus (full length) printer 'set' and 'reset' functions
- Four character printer sequences are now catered for, provided that the first character of such a sequence is always the escape code
- Alternatively the program can now cater for 'long' sequences of up to eight characters. In this mode up to seven highlights are available.

page 53 ▶

Full scale extra

AN EXTRA facility for use with Nigel Jenning's *Graph* program in the April 85 issue, has been offered by R Oswald from Menai Bridge. As it stands Nigel's program allows you to alter the scale factor which is very helpful when it comes to blowing up portions of curves for more detailed observation. Sometimes Y values may be greater than the corresponding X values or vice versa, and so it becomes desirable to have completely different scales for the X and Y axes. This can be accomplished by adding to and modifying the original program as follows:

```
280 PROC_PLOT((40-XA%)/60/SFX,1)
360 SFX=1:SFY=1
720 PRINTTAB(17);"SFX: ";SFX;
725 PRINTTAB(27);"SF7: ";SFY;
740 IF Code%(I%) PRINTTAB((I%+1)*10-3)
;Code$(I%);
800 IF Code%(5) P%=69 ELSE P%=5:X=S:Y=
EVAL(A$):PLOT 4,X*60*SFX,Y*48*SFY
810 FOR X=S TO (1240-XA%)/60/SFX STEP
.1/SFX
840 PLOT P%,X*60*SFX,Y*48*SFY
1080 IF Code%(4) AND XC%/60/SFX<>0 PRIN
T XC%/60/SFX
1170 IF Code%(4) AND YC%/48/SFY<>0 PRIN
T YC%/48/SFY
1340 INPUT TAB(0,31) "Enter Scale Facto
r: SFX " SFX
1345 INPUT TAB(0,31) "Enter Scale Facto
r: SFY " SFY
1350 UNTIL SFX>0 AND SFY>0
1470 IF ERR=18 OR ERR=20 PROC_PLOT(X+.1
/SFX,I%+1)
1480 IF (ERR=21 OR ERR=22) AND SGN(X)=-
1 PROC_PLOT(.1/SFX,100)
1560 PRINT "SF : Scale Factors";SPC(12)
;": 1,1"
```

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Budge over for additions . . .

MR MOORE, Head of Computer Studies at Marian RC High School for Girls has found a couple of errors in the *Budge* program (April 1985) and has also incorporated an extra checking facility. The three errors (all minor) occur on the following lines. Line 1830 should read:

1830 UNTIL W%=0 OR W%<6

while the tab values in lines 2310 and 2360 should be (29,29).

Kitty is having a holiday but she'll be back soon

The additions are in PROCquestions which at present will accept incorrect inputs. The amended version below (listing 1) will check the validity of input and will only accept valid entries.

. . . And even more additions

YAD Sardar who reads *Acorn User* in Kuwait is well versed in *Budge* as well. Yad makes the following improvement which prints the final VDU definitions a line further down:

```
440 CLS:PRINT:FORC%=0TO14:PRINT vdu$(c%):NEXT
```

```
1800 DEFPROCquestions
1805 REPEAT
1810 PRINTTAB(0,15);SPC(39);CHR$(7)
1815 PRINTTAB(0,15);"No.of chars.across (1-5,default=1)";
1820 INPUT W%
1825 UNTIL W%=0 OR W%<6
1830 IF W%=0 THEN W%=1
1835 REPEAT
1840 PRINTTAB(0,17);SPC(39);CHR$(7)
1845 PRINTTAB(0,17);"No.of chars. down (1-3,default=1)";
1850 INPUT H%
1855 UNTIL H%=0 OR H%<4
1860 IF H%=0 THEN H%=1
1865 REPEAT
1870 PRINTTAB(0,19);SPC(39);CHR$(7)
1875 PRINTTAB(0,19);"ASCII codes for chars.to start at"
1880 PRINTSPC(12);"(224-";256-H%*W%;",default=224)";
1885 INPUTU%
1890 UNTIL U%=0 OR U%<257-H%*W%
1895 IF U%=0 THEN U%=224
1900 REPEAT
1905 PRINTTAB(0,21);SPC(39);CHR$(7)
1910 PRINTTAB(0,21);"1st line no.for VDU23 statements"
1915 PRINTSPC(11);"(1-32000,default=1010)";
1920 INPUT LI
1925 UNTIL LI>=0 AND LI<32000
1930 IF LI=0 THEN LI=1010
1935 ENDPROC
```

Listing 1. Add to Budge to check the validity of input.

CENTRAL PROCESSING...

Paul Tang, Dagenham
The pin out of the BBC micro user port is as follows:

Pin 1 – +5V
Pin 2 – CB1
Pin 3 – +5V
Pin 4 – CB2
Pin 5 – 0V
Pin 6 – PB0
Pin 7 – 0V
Pin 8 – PB1
Pin 9 – 0V
Pin 10 – PB2
Pin 11 – 0V
Pin 12 – PB3
Pin 13 – 0V
Pin 14 – PB4
Pin 15 – 0V
Pin 16 – PB5
Pin 17 – 0V
Pin 18 – PB6
Pin 19 – 0V
Pin 20 – PB7

As you view the user port from the back of the micro the even numbered pins appear at the top and the odd numbered pins at the bottom. Pins 1 and 20 connect to the wires at the edge of the ribbon cable.

K Layne, London N17
For your set up of Electron, Plus 1, Plus 3 and Mannesman 80 printer I would suggest that the *View* cartridge would be a suitable wordprocessor for your needs. This has the advantage of being in a ROM chip and thus takes up none of the Electron's usable memory. The cartridge simply slots into one of the cartridge sockets on the Plus 1.

A G Little, Devon
A review of the Morley Teletext adaptor is being undertaken and will appear in the not too distant future.

Miles Washbrook, Worcester
I do not know of anyone who is currently marketing a mode 7 teletext adaptor for the Electron. Sir Computers of Cardiff did produce one, but it is no longer trading. It is rumoured that Acorn might be working on one but I have heard nothing definite on that front.

Ms Bachler
BBC micro games programs will run more slowly on your Electron. This is because the Beeb runs almost twice as fast as the Electron. BBC micro programs usually have delay loops placed in them to make them playable to mere mortals, so to speed them up on the Electron it's necessary to remove them. This would prove to be difficult especially if the programs are of a machine code nature.

Chin Cheng Yeong, Brunei
The 1770 disc controller chip as featured in the B+ cannot be fitted into a normal BBC B micro computer directly, but it is possible to do so with some adaptation. For example Solidisk markets a double density disc controller board utilising this chip. The 6512 microprocessor is almost identical to the 6502. The only difference is that its clock circuitry is much neater.

Finally, to use the Starstick ROM and the Micropulse ROM Box together proceed as follows. Take your Basic chip from IC101 and insert it into any other empty ROM socket. Insert the Micropulse ROM Box cable into IC101. Place the Starstick ROM in the ROM box. When you wish to use the Starstick ROM switch it into position on the ROM Box.

R F Eddolls, Bristol
I'm afraid we are stumped on how you can get hold of the user manuals for the Acorn Systems 2 and 3 other than approach Acorn itself, which you have already tried. Nevertheless, I am copying your letter to Acorn to see if I can persuade them on your behalf!

C Sillars, Ashford, Kent
The DOTFILL program as presented in the January 1985 *Acorn User* contains no errors as demonstrated. It was updated by Peter Sandford in subsequent issues.

K Vergis, Malaysia
The Random Landscapes program in the December 1983 issue of *Acorn User* was correct as published. First Byte AU July 1985 covered how to debug programs.

Because of the large amount of technical enquiries we receive in the *Acorn User* office we are now unable to reply to individual letters. However, this new feature is intended to answer as many of your queries as possible, and provide a useful information spot. Please keep your letters short and to the point.



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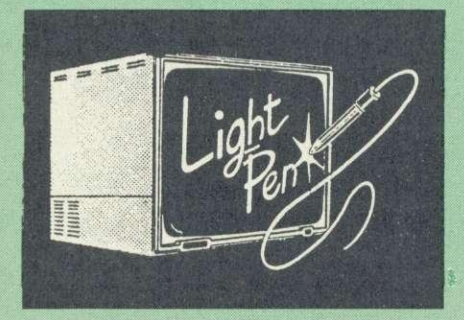
However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

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It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

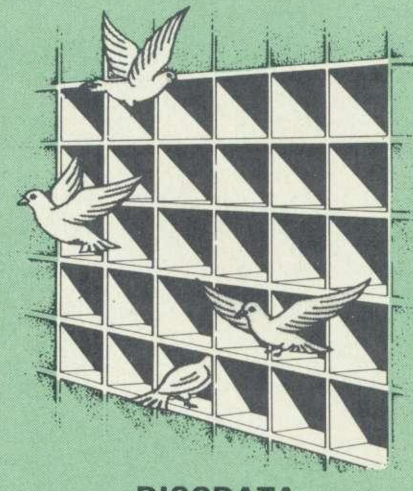
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Cont.

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Obviously, so much RAM requires some powerful facilities to use. To show you just how powerful the features our board offers are, and to convince you that the competition if any, is just simply not worth buying, we shall provide some more details on the advanced features offered.

Each socket has write protection to allow all ROM based software to be run. Also, to help during software development, each socket is equipped with a special read protect facility (this allows recovery from ROM crashes). Up to 8 ROMs and 8 banks (each of 16k) of RAM may be used, or one of the ROMs may be configured to give 16k of battery backed CMOS Static RAM.

The RAM socket selection (which is independent of the normal ROM socket) is performed by a special register at &FF30. In normal systems, a "write" to this location would have no effect. We believe that there is available an inferior board in which, for some totally unexplained reason, the User Port (as used by the AMX Mouse, Eprom Programmers, etc.) is used for the selection. Obviously this was not a very sensible move on the part of this manufacturer.

The ROM/RAM card from Watford represents second generation ROM board technology and is a must for all serious users of the BBC Micro.

Please write in for technical details and further prices.

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In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)
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Just compare the features:

Features	Acorn 1.20	Watford Single Density	Watford Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20	1.42	1.52
	partial	Yes	Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for two years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£65**
- *Acorn's DFS Kit complete* **£70**
- *DFS Manual (Comprehensive)* (no VAT) **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£79**
- *DDFS Manual* (no VAT) **£6.95**
- *We will exchange your existing Single Density for our DDFS Unit at* **£40**

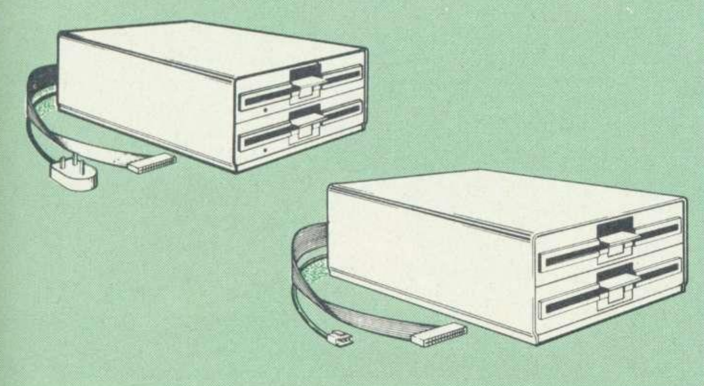
Quality Disc Drives from Watford Electronics

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.
The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".
The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).
With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them. Users of Acorn's DFS will find that they need to pay the extra for switchable drives if they wish to use 40 track discs in an 80 track drive.
The drives we supply are fast (3ms track to track, 15ms settle), quiet and have a low power consumption (average well under 1 amp). Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

Names you can trust, at prices you can afford!

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

All disc drives advertised here will operate in double density mode with the appropriate interface and software.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS100 £85		CS100 £107	
200K (360K)	CLS 200 £86	CLD200 £164	CS 200 £110	CD200 £180
400K (720K)	CLS 400 £110 / £115 CLS400S	CLD 400 £165	£135 CS 400S	CD400 £185
800K (1.44M)		CLD800 £230 / £240 CLD 800S		£259 CD 800S

- TWIN drive CASE, with Power Supply & Cables **£35**
  Securicor carriage on Disc Drives £5

Prefix C = Cased Drive
L = Less PSU
S = Single
D = Double

Suffix S = 40/80 Switchable

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – 5¼" DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 × S/S D/D 40 Track Diskettes* **£13**
- *10 × D/S D/D 40 Track Diskettes* **£18**
- *10 × S/S D/D 80 Track Diskettes* **£22**
- *10 × D/S D/D 80 Track Diskettes* **£24**

QUALITY 5¼" DISKETTES at KNOCK DOWN PRICES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs, each with a life-time guarantee. These are supplied packaged in an attractive plastic library disc box to protect them from damage.

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£11**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£15**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£20**

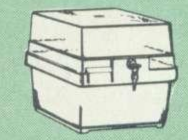
DISC ALBUMS

Attractively finished in beige leather-look vinyl, these conveniently store upto 20 Discs. Each Disc can easily be seen through the clear view pockets.

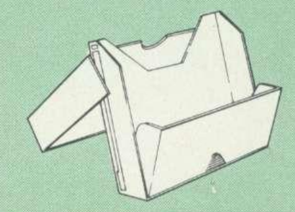
£4.25

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



M35 - holds upto 40 discs **£10**
M85 – holds upto 95 discs **£12**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

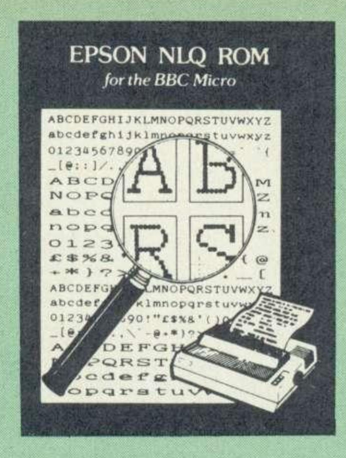
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.25** Twin (with PSU) **£3.90**





Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:
- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £22

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00



THE NLQ DESIGNER

The Kaga Taxan KP810 and KP910 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on.

A 40/80 track format disc containing 3 example fonts is included in the package.

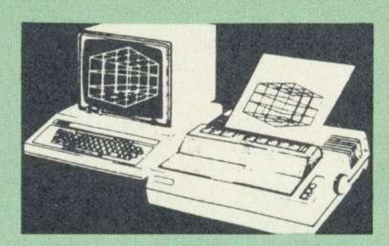
(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

NLQ DESIGNER & FONT DISC **£25**

INDIVIDUAL Preprogrammed FONT ROMS **£15**

(Please write in for further details on both the NLQ DESIGNER and the individual font ROMs available.)

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:
- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £24 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers: CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/120/200/400, etc. etc.
Price including comprehensive manual

£24

SPARK DUMP ROM

A screen Dump ROM for the Acorn/Olivetti Spark jet printers. Works in modes 0/1/2/4/5/7. Does vertical & Horizontal scaling. Positive & Negative grey scaling.

Only: **£12**

VIEW

VIEW WORDPROCESSOR
We are supplying the new VIEW version 2.1 allowing printing of memory contents etc **£46**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft) **£49**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £9

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £8

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 EB 50 and converted typewriters EX43/44 & 55.

Only: £8

BEEB PRINTER ROM



"Makes Printing Childs Play"

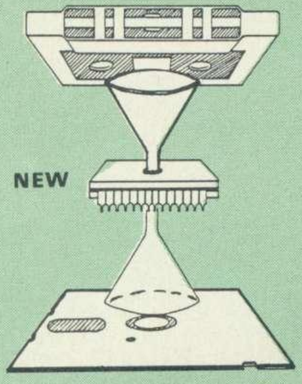
This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:
★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.
★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

TRANSFEROM

(Tape to Disc Utility)

NEW



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

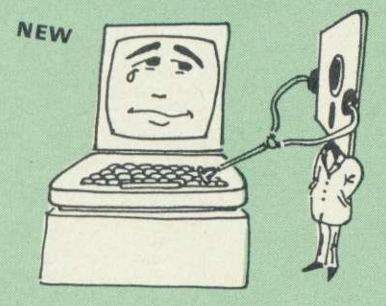
TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£22.00

DIAGNOSTICS DISC

NEW



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £15.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!



ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£43**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

BEEBMON

Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.
Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

Superb value for money at only:

£24

DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

ONLY **£18**

Please write in for technical details.

ROM MANAGER

'Provides comprehensive management of all your installed ROMs – BEEBUG Nov. '84'.
This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.
ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.
The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX/ASCII editor) and list ROM titles neatly and concisely.

Price **£20**

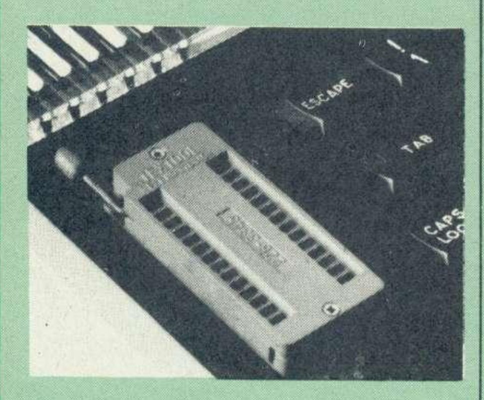
DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10**

(Please specify whether 40 or 80 track disc when ordering)

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.
- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15**

Nightingale Modem

Now Watford brings you PACE's NIGHTINGALE MODEM PACKAGE including the popular Commstar ROM software for the BBC Micro. Nightingale is considered to be by far the most versatile BT approved modem available at the price for the BBC Micro. It is ideal for home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) as well as 300/300 baud full duplex for communication between BBC and other computers, including bulletin boards. A bargain at our

SPECIAL INTRODUCTORY OFFER

(Price includes COMMSTAR ROM & comprehensive manuals) **£119**

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

DEMON Modem Package

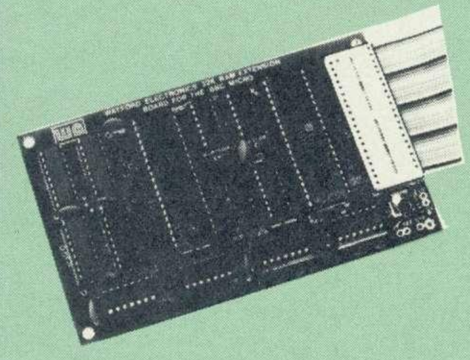
Price: **£69.95** (Carr. £3)

Auto dial software disc **£4.25**

(Please specify 40 or 80 track)

(Note: Demon is not BT approved)

32K RAM- PRINTER BUFFER EXPANSION BOARD



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- In "VIEW", type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc).
- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Offer price

Only: £60

(Price includes a comprehensive manual and the ROM)

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£86**

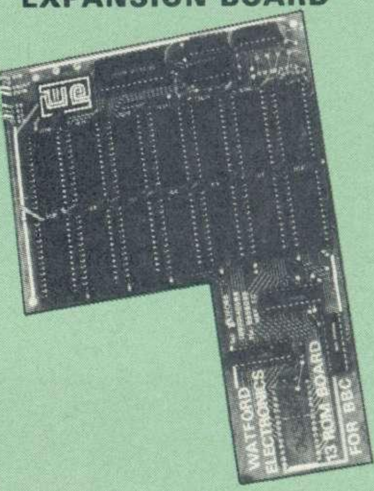
BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in 13 different styles:

It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V – press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.
You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters.
A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY **£32**

Mk-2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.
Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead).
Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the board meets or exceeds all timings for operation in the BBC Microcomputer.

Supplied ready-built and tested complete with fitting instructions.

Only £30

PCB NI-CAD Battery for ROM Boards.

£2

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28
INTER-SHEET	£48
INTERCHART	38
TERMI	£27
COMMUNICATOR	£58
SPEECH ROM	£25

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: **£32**

WORDWISE PLUS

Now available from stock **£47**

WORDWISE PLUS UPGRADES

Existing users of Wordwise can upgrade to WORDWISE + for **£19.** Please return the old WORDWISE package complete with Chip and MANUAL with your remittance and we will send you the new WORDWISE + package.



Word-Aid

The most comprehensive utilities disc for Wordwise-Plus

Take advantage of the programming language in Wordwise-Plus. Simply load the disc with Shift-Break and have the power of these sophisticated new features instantly at your fingertips.

Features:

- Mail Merger
  - * Can use Data files spooled from Wordwise-Plus.
  - * Can use Data files from most databases.
  - * Powerful Label printing facilities.
  - * Mail merges with names, addresses etc. inserted into a standard letter.

- Address Finder
  - * Search for names.
  - * Search for addresses.
  - * Insert names into text.
  - * Insert addresses into text.

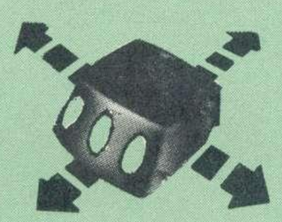
- Print/Preview continuous files.
- Chapter Marker.
- Search and Display.
- Remove embedded commands.
- Text transfer.
- Printer Codes – make embedding commands easier.
- Utilities supplied compressed for speed.
- Utilities supplied anotated for help.
- Supplied on 40/80 format disc.
- Very user friendly.
- Recommended by Computer Concept.

Introductory Offer: **£12**

(Further details available on request SAE, please).

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



ONLY: £68.50

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

AMX Desk package	**£19.00**
AMX UTILITY package	**£11.50**

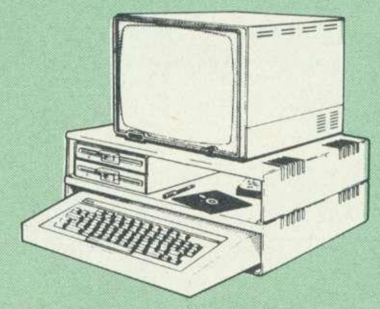
COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really bring those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Special Offer: **£10** (£7 carr.)

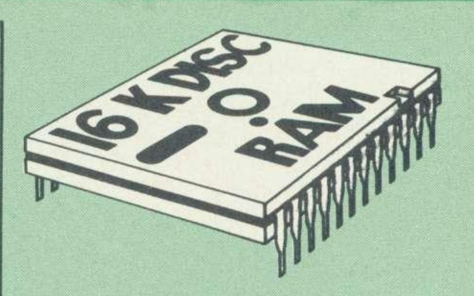
(please specify 40 or 80 track disc when ordering)

PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH .... **£11** (carr. £1.50)
DOUBLE BBC PLINTH .... **£19** (carr. £2.00)
PRINTER PLINTH .... **£10** (carr. £1.50)



This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £32

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £35



BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
100 Programs for BBC Micro	£6.95
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Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
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Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
Applied Assembly Lang. for BBC	£7.95
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BBC Micro An Expert Guide	£6.95
BBC Micro Assembly Language	£7.95
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BBC Micro Games Master	£5.95
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BBC Micro Programs in Basic	£5.95
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BBC User Guide	£10.00
BBC Wargaming	£8.95
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CP/M Soul of	£14.95
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Disc Programming Techniques	£7.95
Disc System for the BBC	£6.95
Discover BBC Machine Code	£6.95
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Electron Machine Code for Beginners	£6.95
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Wordstar & CP/M made easy	£6.95

NEW LAUNCH

BEEB VIDEO DIGITISER

THE LATEST IN HIGH TECH FROM WATFORD

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

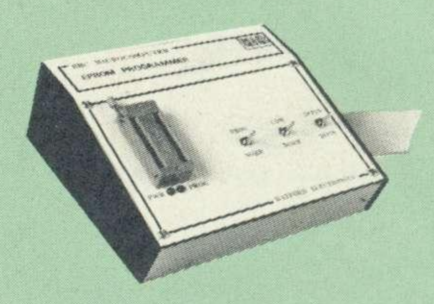
Features offered by this package include:
- The adding of pictures or written text to typed documents.
- Unattended recording of scientific data.
- Entry of real images into graphics programs.
- Generation of computer images.
- Slow scan television; sending images via a modem or radio.
- Security.
- Input from any video 1v video source.
- Full resolution in Modes 0,1 or 2.
- 1.6 seconds scan time.
- Up to 8 grey levels
- Manual or Auto level control
- Connects to user port

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£89 (Carr. £2)

(Price includes: Digitiser Unit, ROM & a comprehensive Manual.)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69
(£3 carr.)

LOW COST 'DIN' EPROM PROGRAMMER

A high performance, low cost, self contained 'DIN' EPROM PROGRAMMER for the BBC Micro. Plugs into the BBC Micro's user port.

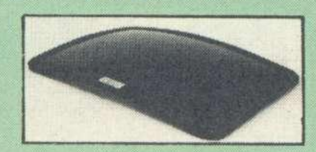
The features are:
- Will program 2716, 2732, 2532, 2764 & 27128 EPROMs.
- Copy Eprom into memory and compute checksum.
- Blank check EPROM.
- Program EPROM from memory.
- Verify programmed EPROM and display checksum.
- All * commands may be used from menu mode.
- High speed programming on 2764 & 27128.
- Machine code SOFTWARE supplied in ROM.

Only: **£49.50** (carr. £2)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.
- **ERASER EB** – Standard version erases up to 16 chips. **£28**
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30**
- Spare UV tubes. **£9**

ANTI GLARE MONITOR SAFETY SCREEN



HEADACHES? TIRED EYES? Don't take pills – Use a Watford Electronics anti-glare filter!

Available in 12" & 14" versions – please specify the exact monitor type when ordering.

Special Price: **£16.00** (carr. £2)

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. Suitable for computers, Hi-Fi, Fridge Freezers etc. Max Surge current 2KAmp; max. Voltage 250. Essential for serious computer users.

Protection for only **£9.50**

FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

£4

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£11** (£2 carr.)

DATA RECORDER

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter.

£20

DATA CABLE to connect recorder to BBC **£2.00**

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

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(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug

to 5 pin DIN Plug + 1 Jack Plug	£2.00
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to 7 pin DIN Plug	£2.50
to 3 Jack Plugs	£2.00
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**

DISC DRIVE POWER LEADS

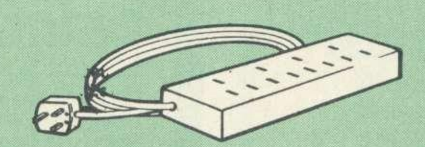
Supply from BBC power supply to standard Disc Drive connector.

Single **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

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Speech Chips, Manual and full fitting instructions

Only £19

28 pin ZIF SOCKET (Textool) **£6.95**

28pin DIL HEADER PLUG

SOLDER type	£2.90
IDC CRIMP type	£3

RIBBON CABLE

28way **55p/ft;** 34way **60p/ft.**

8way DIP SWITCH **£0.85**

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SAA5050	£8.75	SN76489	£5.50
2764-250nS	£2.50	27128-250nS	£4.00
6116LP-2K	£2.75	6264LP-8K	£5.80
8271	£48	ACORN DNFS	£15
ACORN OS 1.2	£6	ACORN BASIC 2	£16

SLEUTH ROM **£25** TOOLKIT ROM **£23**
BBC A to B Upgrade Kit **£45**



SPOIL-SPORT ROM

BANISH GAMES . . . DEVELOP BRAINS
Is it that all too often your BBC Micro is being used to stage intagalatic war? Would you rather it was put to a better use?
The answer is now simple. Fit a WATFORD SPOIL-SPORT ROM.

It will:

- Stop machine code games being played on your BBC MICRO.
- Promote serious BASIC programming.
- Allow you to 'UNLOCK' your micro only with a preprogrammed password (in ROM).
- Interface with both disc or tape based micros.

This ROM is ideal for SCHOOLS, COLLEGES, etc.

Only £20

(Please specify password required when ordering.)



16K Sideways RAM Modules

The revolutionary design RAM Module you've been waiting for! Write and Read protectable, with optional battery backup. Works in a standard BBC micro or one with a ROM board.

Just look at the features:

- Compact construction.
- Fit multiple units with ease.
- No overloading problems.
- Free utilities software supplied on disc.
- Works with any ROM.
- Ideal for professional software development.
- Can be used as a 16k printer buffer as well.
- Load ROMs as needed – no messy unplugging, etc.

Introductory price: **£29**

Optional extras

BATTERY BACKUP **£3**
READ and WRITE protect Switches **£2**
(Supplied already fitted if ordered with the Module)

LOGOTRON LOGO

The popular Logotron Logo in ROM.
Recommended by most Education authorities.
Only: £55

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MAIL ORDER AND RETAIL SHOP TRADE AND EXPORT INQUIRIES WELCOME. GOVERNMENT AND EDUCATIONAL ESTABLISHMENTS OFFICIAL ORDERS ACCEPTED.
CARRIAGE: Minimum £1 on all cash orders. On bulky items, Securicor charge applies.
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AVAILABLE TO BBC,B USERS ONLY

THIS UNIQUE INTERFACE, INCORPORATING ITS OWN VIEW DRIVER, WILL ENABLE YOU TO USE THE BROTHER TYPEWRITERS AS LETTER QUALITY PRINTERS. ITS EASY TO INSTALL AND COMES COMPLETE WITH FULL DOCUMENTATION.

COMPARE THIS PRICE FOR A LETTER QUALITY PRINTER

CE51 **£299** + VAT.

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PURCHASE THE INTERFACE ONLY FOR £75 INCL. VAT

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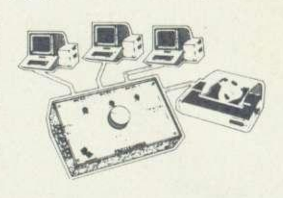


No Problems with Cable Lengths or Data Loss/Errors
Having Separate Ports, Avoids Over-loading Computer
Metal case with built-in power supply and fitted plug

THE PRINTERSHARERS

(SEVERAL MICROS TO 1 PRINTER)

PARALLEL: (AS BBC)	3 WAY **£60**-(b)	6 WAY **£110**-(c)
CENTRONICS: (36 PIN)	2 WAY **£85**-(c)	3 WAY **£95** -(c)
SERIAL RS232	3 WAY – **£65**-(b)	
RS423 5-Din (As BBC)	3 WAY – **£40**-(b)	



THE PRINTCHANGERS

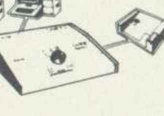
(1 MICRO TO SEVERAL PRINTERS)

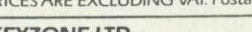
PARALLEL – 26 PIN	3 WAY –	**£60**-(b)
CENTRONICS – 36 PIN	2 WAY –	**£85**-(c)
	2 WAY –	**£95** -(c)
SERIAL RS232	3 WAY –	**£65**-(b)
RS423	2 WAY –	**£40**-(b)

THE PRINTERCROSSOVERS

(2 MICROS TO 2 PRINTERS)

PARALLEL –	26 PIN	**£70**-(c)
CENTRONICS –	36 PIN	**£95**-(c)
SERIAL RS232		**£70**-(b)





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BBC B+	**£380.00** +7.00p&p
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6502 2nd Processor	**£173.00** +2.50p&p

Mini ROM Board

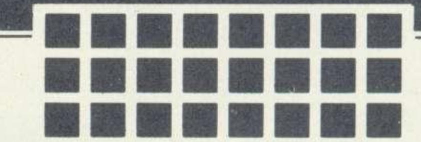
- 8 rom sockets
- Fully compatible
- Easy installation
- 12 month replacement guarantee
- Compatible with Aries B20
- Quick despatch

£12.00 +1.50p&p

400K Mitsubishi/TEAC Disc Drives 40/80tk	**£129.00** +3.00p&p
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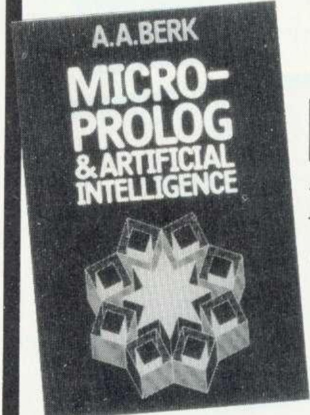
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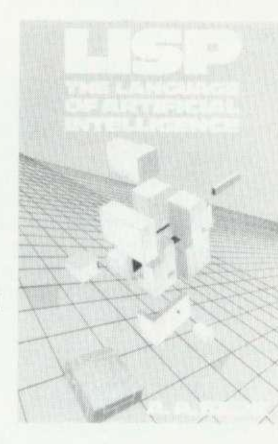
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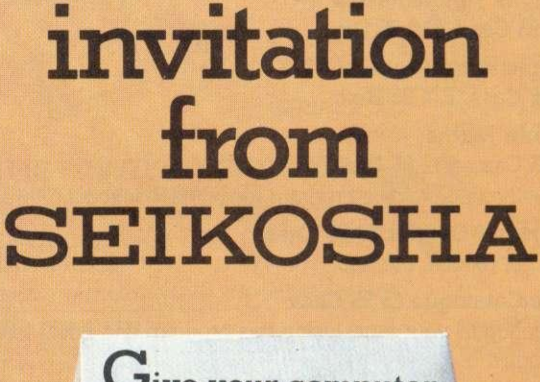
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ONE BOY AND HIS MICROS

Mary Sargent reports on how Christopher's Beeb-controlled 'superchair' has changed his life

CHRISTOPHER is a small boy who has more electronic contraptions to play with than most adults will meet in a lifetime. He has not one but two BBC micros, plus disc drives, joysticks, electronic switches and software written specifically with him in mind. And not even the most dedicated computer enthusiast would envy him.

Christopher is nearly four years old, and for three of those years he has been paralysed from the neck down. He can speak, he has full control of his facial muscles and he can move his head sideways, but the accident which crippled him at the age of 12 months left him unable to breathe without a ventilator and dependent on oxygen because of lung damage.

Little Christopher lives in a ward of the Children's Hospital in Great Ormond Street, London, and it was staff there who embarked on the unusual project which bears his name, in order to help give Christopher mobility, stimulation and some form of limited independence. The end result, it is hoped, may benefit hundreds of children as severely handicapped as he is, and could be the most important use yet of microtechnology outside industry.

Project Christopher is directed by Jo Douglas, a Senior Clinical Psychologist at Great Ormond Street, who was asked to assess what communication aids were needed for him. Someone suggested that it might be worth applying for a grant from the Department of Trade and Industry, which agreed to fund a three-year project to 'develop and provide a comprehensive range of micro-electronic aids that will simulate normal developmental opportunities and enable maximal cognitive development of the severely physically handicapped pre-school child'.

The BBC micro was chosen for the project because of its flexibility. The wide range of readily available peripherals and the excellent user port made it easier to adapt hardware to Christopher's use, and it is also the computer most likely to be used by schools and other institutions dealing with handicapped children.

After some disappointing experiences with commercial software for pre-school children, Jo decided to commission a software house to write a suite of learning games for Christopher's use. She chose Widgit, and for six months Tina and Mike Detheridge have been designing and testing colourful routines to teach and stimulate the imagination of young children whose environment is restricted. Their work so far has been received with enthusiasm, not just by Christopher but also by his speech therapist.

Because their brief is to produce programs of educational value to any physically handicapped pre-school child, Mike and Tina Dethridge have not met Christopher. Their programs are put to the test in the local nursery school, and only when the content is to the satisfaction of the children there do they adapt the control of the program to suit the handicapped child.

This is not the case so far as Brian Reeson is concerned. He is the bio-engineer responsible for the construction and interfacing of all the hardware Christopher needs to give him some mobility and independence. It is a mammoth undertaking, linked very specifically to Christopher's own needs, but the results will be significant to many. As with the software, there are few products available which are useful to the very young physically handicapped, and what there is has had to be modified, extended and supplemented to create Christopher's mobile, computerised environment.

The basis of the whole thing is Christopher's modified wheelchair, which carries not only his oxygen cylinders



Christopher uses an Armdroid to overcome his handicap and knock down wooden blocks

and ventilator, with their accompanying electronic alarm and monitoring gadgetry, but an onboard BBC micro as well. Because of the extent of his disabilities, Christopher will need to control his chair via the computer rather than with a more conventional joystick. He will be able to move the chair forwards and backwards, and adjust the position up and down. Eventually, it is hoped that this can be achieved by voice control, but until that is perfected, Brian Reeson has fixed up proximity switches which can be triggered by a finger, head or even tongue movement.

Linked to the chair's computer is a largely conventional BBC model B, which displays the Widgit programs as well as controlling peripherals. The two computers are linked by an infra-red serial interface which is configured as shown in figure 1, and which is considerably more complex than it appears. There is a need for two-way communication on the serial link – 'but that's a task for the autumn'. All the chair's electronics are powered by sealed batteries concealed between the wheels, and these are recharged every day. There can be no question of mains power for the onboard computer. Four elements make up the computer electronics: the Beeb (minus its case) as the intelligent controller, its ports connected to the speech recognition unit, a DE-Talker and proximity switch electronics. The DE-Talker is a speech synthesiser which provides audio confirmation that commands have been executed.

The four units are compact, fixed to the top of the chair, and can easily be removed for modifications. 'Christopher cannot be denied his chair whenever I need to work on the system,' says Reeson – and this happens often as work progresses. The speech recognition software, for example, is yet to be completed, so Christopher runs the computers using proximity switches.

The hardware, bought at a cost of some £1500 specially for the project, is the American SYS300 system, which can recognise as many as 300 words. It is fast and Reeson is pleased with its performance: 'The only problem is that you have to teach the system its vocabulary.' At three iterations per word, this is a time-consuming task for anyone, and even more so for anyone with a speech impediment. The makers claim a 98 per cent recognition rate, and its decoding speed can be improved considerably when dealing with short vocabularies, such as recognising the spoken numbers nought to nine. The system is triggered by $1\frac{1}{2}$ seconds of vocalisation on the microphone, whereupon the spoken instruction is interpreted by the mobile Beeb, and transformed into a string of 'keystroke-sequences' which are transmitted to the stationary Beeb. The technology is sound, but the application untried.

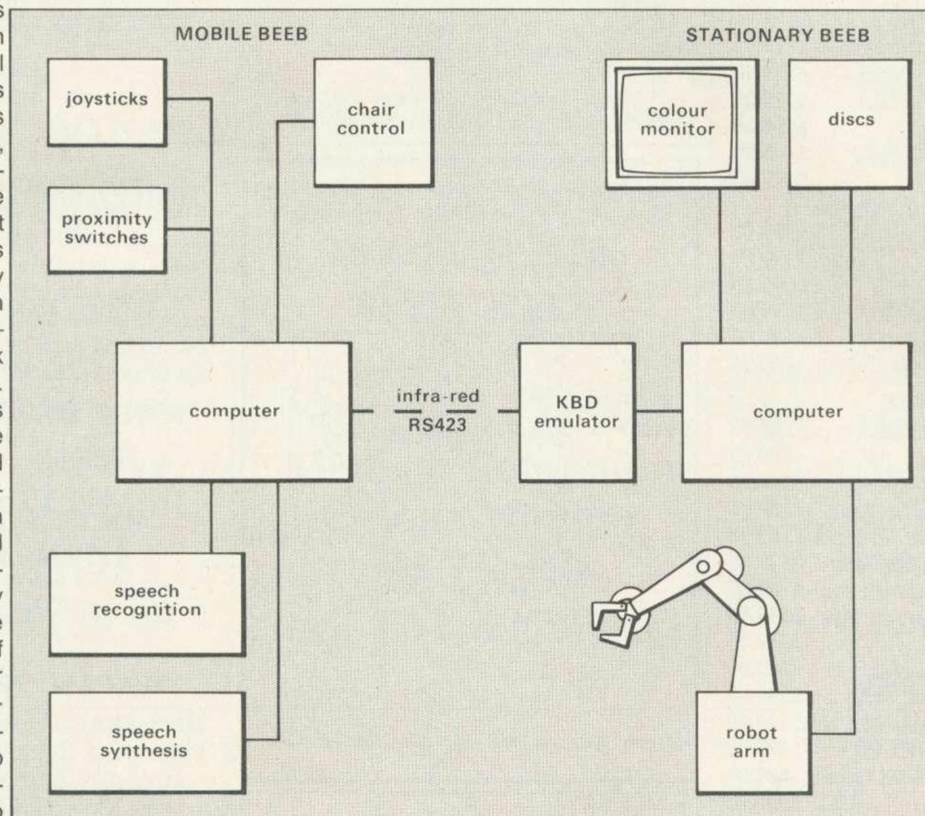


Figure 1. How the mobile and stationary micros are linked by an infra-red serial interface

The software in the mobile Beeb performs housekeeping tasks and keeps all the onboard peripherals happy. All the ports are used, and Reeson may have to fit one or more 6522s as the system grows. The SYS300 is connected to the RS423, the joysticks and proximity switches are on the analogue port, and the chair is driven from the user port. One bit of the user port forms the simulated RS423 which drives the infra-red link. At the end of this link is the computer which gives Christopher the facility to learn and play. A keyboard emulator from Clwyd Technic in Wales decodes the serial transmission and runs a normal model B computer, disc system and colour monitor. It is here that Widgit's software comes into the picture, but it doesn't take over Christopher's environment entirely.

Attached to the stationary Beeb is Colne Robotic's Armdroid, a six-axis robot arm. Christopher uses Armdroid to knock down wooden building blocks, and the programming will allow him to build them up again when he has learned to manipulate the arm fully. Ultimately he may use voice commands, but for the present a proximity switch or sound-activated switch suffices. Reeson has put together the arm-control software, which is specially tailored to a child's needs. Initially, a young handicapped child can't cope with the degrees of freedom that the Colne arm offers. An on-screen menu breaks the problem down into manageable proportions.

For Christopher, even a joystick is a problem, since it must be positioned in front of the mouth. 'The standard commercial joystick is simply too large,' says Reeson. 'It would take away a third of Christopher's view.' So a small unit housing a couple of potentiometers has to be made. 'It's a fairly standard two-axis joystick but because his movement is so limited, op-amps have been put in to provide amplification and offset adjustments.' The microphone is a subsonic sensor, highly directional, with electronics causing it to respond to the elements in the 'P' sound. Regular speech and most environmental noise will not trigger it, but saying 'P' cycles a pointer round the monitor screen and selects the robot arm axis. The joystick then moves the axis.

Project Christopher is a beginning. Its objectives are clear, though limited, but Jo Douglas is far from depressed. Before this, there was nothing available for pre-school handicapped children, except adult time. Now there is reason to hope that these children will learn to play and to teach themselves.

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THAT SINKING FEELING

A life on the ocean waves could be for you as captain of the ship in Phil Martin's submarine game, 'Run Silent, Run Deep'

THIS is a nautical game called 'Run Silent, Run Deep' inspired by the film of the same name. You take Robert Mitchum's role of the captain of a destroyer and your task is to locate and destroy a submarine which is somewhere on the screen. This all takes place in real time using colour graphics and sound. The submarine moves, changes depth and fires torpedoes. Other features such as the minefields and the surface currents are all designed to make life a little more interesting for the fearless captain.

To find the submarine you have to listen to an echo location sounder that also gives a visible output on the screen – in the easy stages. The echo location sounder makes the famous rhythmic pinging noise heard in all the best submarine films.

Once you think you know where the sub is you drop a depth charge set to explode at the appropriate depth and wait. If the sub is still there when the charge explodes, BOOM! But it may have moved in the time it took the charge to fall that deep.

Entering the program

For the sake of saving memory, the main program contains few useful comments, no long variable names and makes use of pages nine and 10 to run the sonar scope and store the high score table. It will run (just) with PAGE = &1100, so it can be chained straight from disc. Obviously the program could be larger with PAGE = &E00, but much more processing done in the main loop would slow it down unacceptably.

The game loads as two programs. The header program (listing 1) defines the characters and envelopes and explains the controls. It then sets PAGE to &1100 and chains the second program (listing 2) which is the game itself. The setting up of PAGE is very important to both second processor and disc users because otherwise the game will not run. Tape users can delete line 570 from the header program to leave PAGE at &E00, giving them a little more room if they want.

Type in the header program (listing 1) and save it using whatever filename

ILLUSTRATION BY MICHAEL BROWNLOW

you like (I used "B.RUNDEEP"). Then type in the game itself (listing 2) and save this as "RUN2" so that the header program can chain it. If you are going to run the game at PAGE = &1100 in a standard Beeb (ie, without second processor, RAM extension board, etc) you should make sure the program is not more than &1B40 bytes long. If it is larger than this then you will probably get the No room error. You can check by entering:

```
PRINT~TOP-PAGE <return>
```

If this is larger than &1B40 you should start to look for unwanted spaces or simply delete some of the spacing lines that just contain colons. Disc users must be very careful not to press Break while the game is located at PAGE = &1100 because the DFS will claim back its workspace and corrupt the program.

In theory the game will work on an Electron, but in practice it will run much too slowly to be worthwhile. By contrast, the 6502 second processor runs the program as it stands much too fast. The submarine is very difficult to find as it speeds unseen under the surface and depth charges fall so fast you are easily caught by them. The following modifications should be made to run the game on the second processor:

```
 290 IF B% dcdt% = dcdt% + 1:
     IF dcdt% > = W% PROCcharge
1610 D% = RND( - TIME):
     ch% = 0:speed% = 8
1620 a = 0.5:f = 1/32
2410 DEF FNsv = (RND(3) - 2)*0.5
```

These give you better control and resolution on the sonar.

With the extra speed and memory available on the second processor, extra features can be added such as torpedoes being fired into the area from the edges, as in *Frak!* There was no room for input checking when entering names for the high score table so it's possible to crash the program if you type in certain control characters. An input checking routine could be added if you have room to spare.

Tape users should note that the program uses the cassette workspace in

pages nine and 10 to hold the sonar trace and high scores respectively. This should not be a problem since the program does not use the cassette filing system.

How it works

The main program is run as three nested loops. The outermost is an infinite loop inside which the game is played and the scores are displayed. A new page is displayed each time through the second loop, which ends when the ship or sub is destroyed or when time runs out or no more charges are left. The innermost is a REPEAT UNTIL loop in which all the hard work is done. This loop is terminated when no depth charge is falling and something has exploded or time is up. If the submarine has exploded, the program is reset for the next page and continues. Otherwise, you are told why you failed and the high score table is updated if necessary before the game is allowed to start again.

After the main program and the error trap come the procedure definitions. There is a complete list of all the procedures and functions in table 2. Here's how the most important ones work:

PROCsonar(X%,Y%,S%) If S% is TRUE it is time for a new 'ping' and it is then that various other things are done. The interval timer T% is reset, message generation is updated, the wavefront distance and the height of the sonar trace are zeroed. The procedure then moves the wave out and checks to see if it has passed the sub. If it has, it records the fact in F% and makes a submarine echo. It also generates other misleading echoes according to the value of D% which is the difficulty rating. If you have passed page eight the sonar trace is left blank and the procedure ends. Otherwise the height, H%, of the trace is decremented by the gradient, G%, and the trace is redrawn at a distance along the X axis equal to that travelled by the sound wave.

PROCship(X%,Y%) simply EORs a ship character on to the screen centred at X%,Y%.

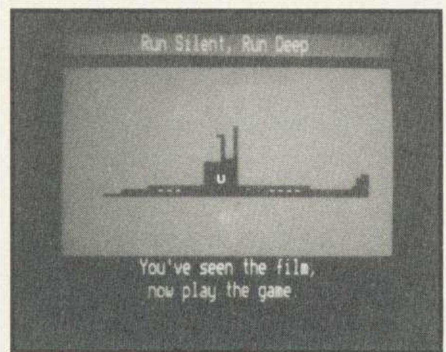
PROCcharge is called when a depth charge has reached the set level. It checks whether the explosion is close enough to the submarine to destroy or damage it. If the sub is damaged, V% is set up to hold it still for a while and O% is set up to produce an oil slick. If it's destroyed, E% is also set up to make an explosion. The procedure then checks whether the ship is too close to the explosion and if so calls PROCds to destroy the ship.

PROCsub first tests whether it can release a torpedo successfully. If it can, torp% and the torpedo's controlling variables are set, and the submarine changes course. The procedure also decides whether to change depth, whether to display the periscope, and when to change the submarine's course. The sub's co-ordinates are tested to see if it's in the minefield and if so it may cut one of the mines loose to float to the surface.

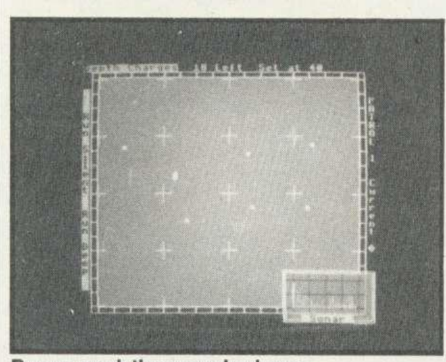
PROCoil(X%,Y%) first decrements the oil countdown timer, then draws three oil patches around X%,Y%.

PROCexpl(X%,Y%) decrements the explosion countdown timer and plays one note from the tune. It also draws four bits of explosion. The peculiar condition in the pitch parameter of the SOUND command is to add a sarcastic note to the tune if it is the ship that is exploding.

PROCtorp is called only if there is a torpedo running (set in PROCsub). It moves the torpedo in the set direction and tests to see if it has hit the ship or



Scene-setting: the title page



Buoys mark the searched area

the boundary. If it has hit the ship it sets up the explosion by calling PROCds. If it has reached the boundary it sets torp% to FALSE.

PROCinit is called once only, at the beginning of the program, and is used to set up any permanent variables and the high score table. Two of the variables it sets up are a and f which represent the acceleration and friction forces acting on the ship. If you decide to alter either of these you should make sure that they are always binary fractions, ie, a number which multiplied by some power of two will be an integer. If they are not binary fractions the ship will tend to 'drift' when it's supposed to be stationary.

PROCreset is called at the beginning of every page and sets the position of the ship, the sub and the minefield and various flags.

PROChitable displays the high score table on screen.

PROChiscore(S%) decides whether a score S% should go in the high score table. If it should, you are asked to type in your name and the high score table is amended accordingly.

FNscore(T%) calculates the score for that particular page with T% elapsed time.

FNsv is used to pick one component of the submarine's direction at random.

You will find several places where Booleans (things which can only be TRUE or FALSE) are used in expressions. Fans of Pascal will be horrified by this mixing of variable types – but it works. Some procedures have more than one ENDPROC, which saves a few bytes over the ungainly GOTO equivalent. Apart from these lapses, the program is well structured and uses no GOSUBS and as few GOTOs as is possible.

One technique which is used extensively is the 'countdown timer'. This is just a variable which is decremented each time through the main loop and while the variable is greater than zero a task is carried out.

For example, the variable O% is used to control the oil slicks. If it is greater than zero some oil slick is drawn and O% is decremented. So, to make an oil slick appear, you simply set bx%, by% to be the centre of the slick and put the number of times you want some slick drawn in O%. There are a lot of countdown timers controlling various parts of the game.

Nearly all variables are integer type and most of the resident integers are used in the quest for speed. I tried to use the resident integers logically, so that S% is the score, P% is the periscope-visible flag, etc.

All the global variables used are listed in table 1.

How to play

At the start of every patrol you are told how long you have to complete the mission. Each page is more difficult than the last with the submarine changing depth more often, the minefield getting larger and greater accuracy being required. At page four, you will encounter surface currents which will become stronger, and at page nine the sonar scope is turned off! After the screen display is set up the sonar starts sending out its sound waves. If you're lucky you may get an echo straight away but you will probably have to spend time searching out the submarine.

The standard keys 'Z', 'X', ':' and '/' are used to apply acceleration to the ship in the appropriate directions. When these keys are released the ship will slow down and eventually stop. Don't be afraid of getting lost off the screen – the ship will reappear on the opposite side. You can move on to the corner used by the sonar trace and the submarine can go there too.

The echo location sounder may take a little getting used to. At regular intervals a loud 'ping' makes a circular sound wave travel out at a constant speed from the ship. If the wave hits an object like a submarine or a whale you will hear an echo (which also shows up on the sonar scope as a peak). So if the object is a long way from the ship you will not hear the echo for a long time, or not at all if the object is beyond the range of the wave. As the distance between the ship and the object reduces, the echo comes sooner after the ping and the pitch of the echo will be higher than that of the ping because of the Doppler effect. The sound 'signature' of a submarine is distinctive from those of whales, wrecks, etc. It is a sharper and clearer echo.

When you have a very close echo you can try to drop a depth charge – but remember to move away or your ship will be destroyed. If you miss the sub you will be told so and you will only hear the explosion. If the charge was close enough to the sub to throw up an oil slick, you will be told whether the charge was too deep, too shallow or at the right depth but not close enough in the X,Y plane. The 'cursor up' key decreases the setting of the charges and the 'cursor down' key increases it.

The submarine can move in eight directions – North, South, East, West and the diagonals between them. When the sub reaches the boundary it moves back into the area, always moving away from the edge it has hit, which means it can take three possible courses. It is a good idea to find out which direction the submarine is going so that you can drop your depth charge somewhere in front of it. This ensures that your charge will have fallen to the set depth when the sub gets there. You will get used to how far in front of the sub to drop a charge so that it reaches the right depth at the right time. The sonar trace is a great help in this because the distance along the trace at which the echo appears is the actual distance from the ship to the sub. The submarine can go as deep as 250 metres and will not rise above 10. Periscope depth is 17 metres and it can launch torpedoes if it is above 30 metres.

If you stray into a minefield you will see the sonar trace behave differently; you may hear the high-pitched echoes of mines and get a minefield warning. A number is shown with each minefield warning, telling you how many more you can survive. You can place marker buoys using the Return key to show you where the minefield is.

The 'T' key gives you a message telling the time you have left to complete your mission. (There are two reasons for printing the time this way: first, a constant time display would slow things down too much; second, there's no room on the screen to put it anyway!)

When you destroy the submarine it explodes and *Rule Britannia* is played – well, some of it. Various statistics are then printed out and you go on to the next page.

The game ends when you run out of time or depth charges or if your ship is destroyed. If you have a high enough score your name can be entered on the score board before the game starts again. The score depends on how long it took to destroy the sub, how deep it was when you got it, how many charges it took and how many minefield warnings you received.

A%:	Number of minefield warnings
B%:	Depth-charge-falling flag
C%:	Sub level change countdown timer
D%:	Difficulty rating
E%:	Explosion countdown timer
F%:	Sound-wave-reached-sub flag
G%:	Gradient of sonar decay
H%:	Height of sonar trace
I%:	Loop control
K%:	Killed-ship flag
L%:	Last sub echo distance
M%:	Message time counter
N%:	Number of depth charges left
O%:	Oil slick countdown timer
P%:	Periscope-up flag
Q%:	Ship-wavefront distance
S%:	Score in present game
T%:	Value of TIME at page start
V%:	Sub stationary countdown timer
W%:	Depth setting of falling charge
X%:	X position of ship
Y%:	Y position of ship
Z%:	Sub's rate of change of depth
bx%,by%:	Depth charge position
bd%:	Setting of charges on deck
cx%,cy%:	Sea current velocity components
dcdt%:	Depth of falling charge
d2%:	Difficulty rating D% divided by 2
mb%:	Number of buoys left
mfs%:	Minefield size
mx%,my%:	Minefield position
pg%:	Page number
speed%:	Velocity of sound wave
t%:	Time limit
torp%:	Torpedo-on-screen flag
tx%,ty%:	Torpedo position
txv%,tyv%:	Torpedo velocity components
a:	Acceleration of ship
f:	Friction of ship in water
sx,sy:	Submarine position
sxv,syv:	Sub velocity components
xv,yv:	Ship velocity components
m$:	Message printed at 'ping'
yb$:	Yellow background, black text
bb$:	Black background, yellow text

Table 1. List of global variables

Line no.	FN/PROC
550	PROCsonar(X%,Y%,S%)
650	PROCship(X%,Y%)
680	PROCcharge
800	PROCsub
970	PROCoil(X%,Y%)
1050	PROCexp(X%,Y%)
1140	PROCnsv
1180	PROCtorp
1270	FNhypot(xd%,yd%)
1290	PROCbox(a,b,c,d,lc)
1340	PROCscreen
1610	PROCinit
1690	PROCreset
1890	PROCcross(X%,Y%)
1940	PROCbuoy(X%,Y%)
2030	PROCvert(S$,P%,V%)
2070	PROChitable
2150	PROChiscore(S%)
2270	FNs(n%)
2280	FNn(n%)
2290	PROCss(n%,S%)
2300	PROCsn(n%,S$)
2340	PROCspace
2390	FNscore(T%)
2400	FNinmf(X%,Y%)
2420	FNsv
2440	PROCds
2490	PROCdcd(n%)
2520	PROCinmf
2600	PROCdrop
2660	FNcch
2680	PROClt

Table 2. List of functions and procedures

The 'Run Silent, Run Deep' listings are on yellow pages 98-102.



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CASE which forces input into upper or lower case irrespective of caps/shift lock.

FLIST which lists a program one statement to a line but more importantly it will even list 'BAD PROGRAMS.'

ONEKEY is a single key entry option but you can also define your own strings to any ASCII key, just like an extra 48 function keys.

Another group of commands provide FIND and selective or global SEARCH and REPLACE facilities. These commands work with strings and keywords or a mixture of both e.g. "*FIND PROChelp T", will list the full line containing PROChelp, the 'T' simply tokenizes any keywords.

Yet another group of commands allow lines to be moved or copied to a new location.

The other commands provide function key editor, 'BAD PROGRAM' cure, variable lister, integer variable flush, program compacter etc.

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QUICK ON THE DRAW

Martin Phillips enhances his basic *Easyplot* software



THE *Easyplot* listing presented last month reserves as much memory as possible for the picture store. The amount depends on the mode selected, whether the computer has disc or Econet fitted, and the length of any printer routine included. Most of the commands are stored in just eight bytes, so over 100 commands can be stored in 1k of memory. By using these memory packing techniques it's possible to load and save pictures much quicker than by saving the whole screen picture. It also makes possible the EDIT and MOVE AND REDRAW commands.

The only disadvantage is that should these pictures need to be incorporated into the user's own programs, then the drawing routines must be added too. The program RUNPLOT (listing 1 on the yellow pages) is included for this reason – see the next section for details of how to use it. However, there is still a considerable benefit in time over the full screen saving routine which stores each pixel on the screen, and it gives the user greater flexibility.

To enable the use of all the graphics modes, the *Easyplot* program has been kept as short as possible. Problems may be experienced by users with disc machines, as the disc filing system uses extra memory, leaving less for the user. To get round this problem several special features have been built into the software for disc users.

When the picture files are saved, the first thing to be saved is the number of commands, followed by the byte array A. The first eight bytes of this array store the eight possible actual colour numbers, although in some modes they are not all used. The integer variable Z% holds the position of the next free location in the array A.

Most of the commands are stored as a block of eight bytes. The type of command is held in the variable B%. When finally stored in the array, B% is stored in one byte along with the drawing colour C%. This command code = B%*8 + C%.

B% = 1. . . .Line
B% = 2. . . .Rectangle
B% = 3. . . .Circle
B% = 4. . . .Infill
B% = 15. . . .Move and redraw
B% = 16. . . .Print at
B% = 17. . . .Follow mode

Commands with a B% value of one to nine have a fixed length of eight bytes, commands with a B% value above nine can have an extra length of D% bytes. This gives a great flexibility to the program, and there are plenty of spare command numbers that can be utilised.

The rectangle and line commands are stored in the following manner:

byte 0 command code
byte 1)
byte 2) x% start
byte 3 y% start
byte 4)
byte 5) X% end
byte 6 Y% end
byte 7 D%: – type of line

ILLUSTRATION BY JONATHAN INGLIS



D% = 0 for a solid line, and D% = 16 for a dotted line.

The X co-ordinate has to be stored as a maximum resolution of 640 for mode 0, therefore two bytes are required. The maximum resolution for Y is 255 in any mode, therefore y can be stored as one byte by dividing the actual screen co-ordinate by four.

The circle command is stored in a similar way:

byte 0	command code
byte 1	)
byte 2	) x% centre
byte 3	y% centre
byte 4	)
byte 5	) X% circumference
byte 6	Y% circumference
byte 7	D%: – number of sides

If D% is in range 0-160 then a polygon with solid sides will be drawn and D% will be the number of sides. If D% is greater than 160 then a polygon with dotted sides will be drawn. Then D% MOD 160 will be the number of sides.

The infill command is stored thus:

byte 0	command code	
byte 1	)	
byte 2	) x% start	
byte 3	y% start	
byte 4	f(0,0)	)superpixel colour
byte 5	f(1,0)	)superpixel colour
byte 6	f(0,1)	)superpixel colour
byte 7	f(1,1)	)superpixel colour

The move command needs extra bytes:

byte 0	command code
byte 1	)
byte 2	) Z% start
byte 3	not used
byte 4	)
byte 5	) Z% end
byte 6	not used
byte 7	D% = 8 (extra bytes in command)
byte 8	)
byte 9	)
byte 10	) X offset
byte 11	)
byte 12	)
byte 13	)
byte 14	) Y offset
byte 15	)

Unlike the x and y co-ordinates in most of the commands, it was not worth the extra program lines necessary to pack this command further.

The print command can have a varying length, which is given by D%

byte 0	command code
byte 1	)
byte 2	) x% bottom left start of print
byte 3	y% bottom left start of print
byte 4	not used
byte 5	= 1 for single height, 2 for double height
byte 6	not used
byte 7	D% length of print string
byte 8	
,,	
,,	
,,	String
,,	
,,	
byte 8 + D%	

The vertical print routine has embedded codes to move each letter down and back one pixel between each letter. Not the most efficient way of storage, but it keeps the program short and could be extended to give diagonal print.

Follow mode is the most difficult to pack. Thought has been given to the problem of editing this command, so the follow command is stored in groups of 25 co-ordinates, two bytes for the X co-ordinate followed by one byte for the Y co-ordinate.

byte 0	command code
byte 1	)
byte 2	) x% move position
byte 3	y% move position
byte 4	not used
byte 5	not used
byte 6	not used
byte 7	D%: – number of co-ordinate sets. Maximum 25
byte 8	
,,	
,,	
,,	
byte 83	(This could be shorter)

Using the pictures in programs

It's of little use being able to draw elegant pictures if these cannot easily be displayed or incorporated in your own programs. *Easyplot* has been designed with this in mind, and I've included a program, RUNPLOT, to do this. It contains all the routines for loading in the picture, 'unpacking' the data and the drawing routines. All the variables and procedure names start with a '£' sign to avoid confusion with your own variables and procedures except the integer variable M% which gives the mode. To add this program onto your own, first ensure by renumbering that your program has no line numbers greater than 19999. Then with your program loaded in the computer type *EXEC RUNPLOT and press Return. This enables the program to be loaded in from tape or disc as if you were typing in the lines from the keyboard. Ignore any error messages that may appear. Once loaded the program can be renumbered.

To call a picture named MAP drawn in mode 1, insert the following line at the appropriate point in your program:

```
M% = 1:MODE M%:PROC£LOAD
("MAP")
```

The program then loads the named picture and draws it. The mode must be entered using the above syntax as the drawing routines require the mode value given by M%. This need only be done the first time a picture is loaded or each time a different mode is required. The mode is not selected by the routine and must first be done in the user's program. (A mode change cannot be made in a procedure. Using VDU22 is fraught with problems.) If the mode change had been included in the routine, then the user would have been unable to put one picture on top of another, as changing the mode clears the screen even if it changes to the same mode! There is a three line area at the bottom of the screen for instructions, etc.

Some difficulty may be experienced by users who load in a series of pictures one after the other or who load in a long picture. The RUNPLOT routine contains its own DIM statements to save memory for each picture. The amount of memory saved is tailored to the length of the picture to be loaded in.

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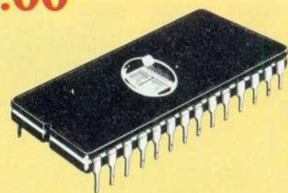
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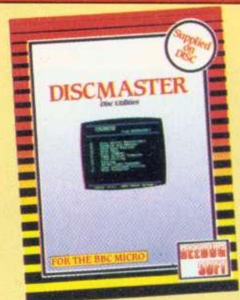
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Each time the procedure is called, a new amount of memory is dimensioned. BBC Basic uses extra memory each time this is done, even though the array has the same name! To get round this problem, heralded by the 'Dim space' or 'No room' errors, first locate the DIM statement that contains the £A (DIM £A £A%), and put it at the start of your own program so that it is dimensioned once only. (In fact it's better if all the DIM statement is put at the start of your program – it's only included in the procedure for compactness.) It's necessary to dimension it to suit the length of the longest picture file, which can be determined by using *CAT to find the picture file length in hexadecimal. This is the value to insert in the DIM statement in place of £A%.

Disc use

The user has the option of loading from and saving to disc or tape and on-screen instructions are provided to do this. If disc is selected, the user is asked which drive to save to or load from. Pictures stored on cassette can be transferred to disc using the in-built routines.

A BBC micro with disc interface fitted has 3k of memory less than that available for the tape user so you cannot use *Easyplot* with modes 0, 1 or 2.

If you have disc drives then two 'hidden' routines can be utilised. Once PLOT2 has loaded and the question 'Which mode?' appears on the screen, type 'R' and the program relocates down to &E00. There is a brief pause, then the program starts again, and now any mode can be selected. You cannot save the pictures on disc, but must save them on tape. In order to run them using RUNPLOT with discs, a second routine is included to transfer pictures from tape to disc, disc to tape, or tape to tape. This is also accessed at the start of the program by typing 'C' when asked 'Which mode?', and you can select a drive for loading and saving.

This program will not work with the 0.98 DFS which was fitted to some machines but not 'officially' released.

Because of the 'Can't extend' error, if a file is to be saved which already exists on disc, the old file will be deleted first, so check before using *Easyplot* which files are already present on the disc, and protect them if necessary by locking them.

User-defined characters

If you want to reproduce pictures which incorporate user-defined characters, here's how. When the picture needs to be redrawn using the RUNPLOT procedure, or programs such as VUFOIL DISPLAY or NOTICE BOARD, then the character set must be loaded in too. This can be done by including the following line at the start of your program:

*LOAD "CHSET"

where CHSET is the filename under which the character set has been saved. If using cassette, this file must be saved immediately after the main program, and before the picture files.

Copying files

The character set is stored in the area of memory from &C00 to &CFF. First load it in from disc or cassette using:

*LOAD"CHSET"

Once the file has loaded, it can be resaved by typing in:

*SAVE"CHSET" C00 CFF

Command extensions

Apart from the possible extension of the types of command, you can improve the existing commands. As memory is so limited, something else has to be sacrificed in order to fit these commands in. Readers might be able to compact PLOT2 still further, or only use them in modes 4 or 5.

Owners of 6502 second processors can extend PLOT2 to include these routines as they'll have spare memory.

The following three routines should be included in the PLOT2 program, replacing the lines of the same numbers. They enable lines, circles, and rectangles to be defined numerically so that the whole shape can be moved round the screen. The use of these alternative routines will have no effect on RUNPLOT, NOTICE BOARD or VUFOIL DISPLAY, therefore it's possible to have an alternative version of PLOT2 with these extensions included.

For Martin Phillips' listing see yellow page 103.

```
  240 B%=1:l%=0:h%=0:ang=0:PRINT"Enter d
imensions Y/N ":PROCg:INPUT"Enter length
 or press return "l%:INPUT"Enter height
or press return "h%:IFl%*h%=0:INPUT"Ente
r angle "ang:ang=0.0001+RADang
  242 IFl%=0 l%=h%/TANang:ELSEIFh%=0 h%=
l%*TANang
  244 PROCe:PROCp:REPEAT:PROCa:IFl%+h%>0
 x%=X%:y%=Y%:X%=x%+l%:Y%=y%+h%
  246 PROCli(6+D%):PROCi:PROCli(6+D%):UN
TILA$=" ":PROCli(5+D%):PROCb:RETURN
```

This routine adapts *PLOT 2* to define lines numerically . . .

```
  250 B%=2:l%=0:h%=0:PRINT"Enter dimensi
ons Y/N":PROCg:IF A$="Y"INPUT"Enter leng
th "l%:INPUT"Enter height "h%
  252 PROCe:PROCp:REPEAT:PROCa:IFh%*l%>0
:x%=X%:X%=x%+l%:y%=Y%:Y%=y%+h%
  254 PROCre(6+D%):PROCi:PROCre(6+D%):UN
TILA$=" ":PROCre(5+D%):PROCb:RETURN
```

. . . Replace these lines in *PLOT 2* to do the same for rectangles . . .

```
  260 B%=3:INPUT"Number of sides "P%:INP
UT"Enter radius or press return "c%:ang=
0:IFP%<30:INPUT"Enter angle or press ret
urn "ang:IFang<91 ang=ang-0.1
  262 ang=RAD(ang):PROCe:PROCp:PROCf(x%,
y%):REPEAT:PROCa:IFc%>0:PROCf(x%,y%):x%=
X%:y%=Y%:Y%=Y%+c%*SINang:X%=X%+c%*COSang
:PROCf(x%,y%)
  264 PROCf(X%,Y%):PROCci(6+D%):PROCi:PR
OCci(6+D%):PROCf(X%,Y%):UNTILA$=" ":PROC
f(x%,y%):PLOT69,x%,y%:PROCb:PROCci(5+D%)
:RETURN
```

. . . And finally, for circles (see text for how to use them)

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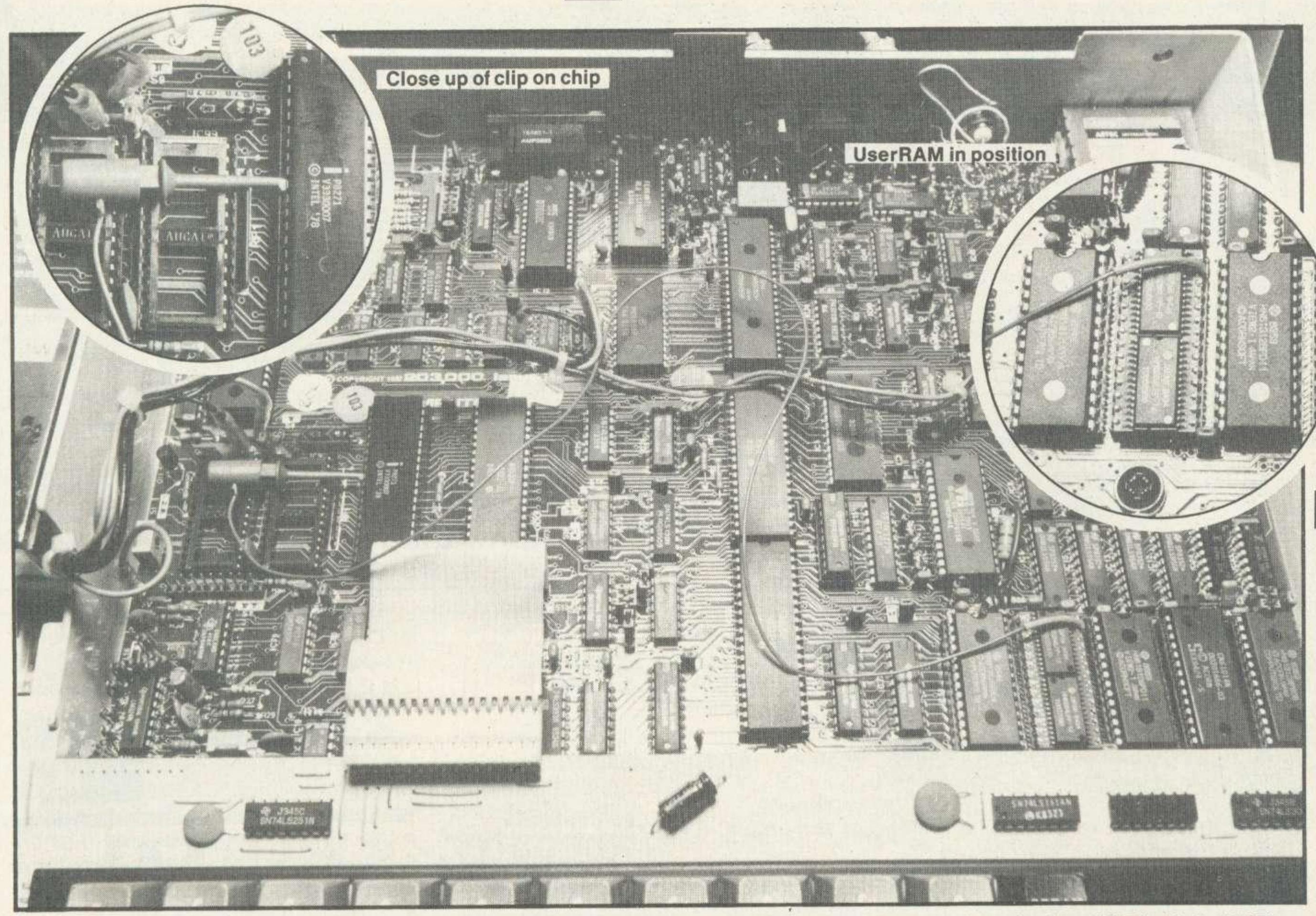
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UserRAM in place in BBC micro sideways RAM socket between OS and *View* ROMs. Lead goes across board to leg of 8271 chip (or IC77)

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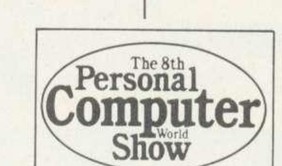
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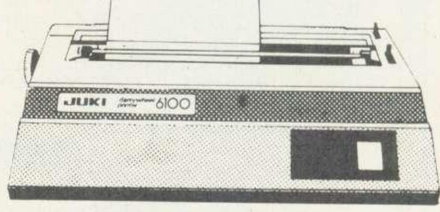
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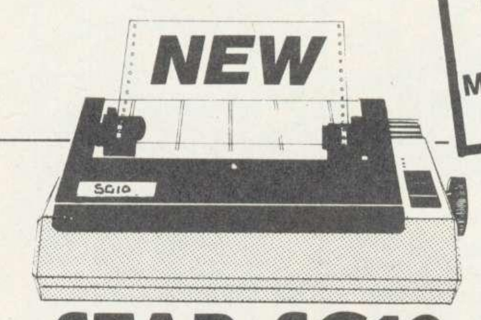
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MAD ALEX'S EARRING AID

Simon Dally sends Mad Alex on another long trail of confusion

MAD Alex once again holds the key to the solution to this month's competition. Recently he decided he was in need of a complete reset – and how better to achieve it, he speculated, than take a nice trip to Venice on the luxury Orient Express.

Only one minor drawback clouded this agreeable vision – his employers seemed dubious at his assurances that their temperamental Econet system would receive the same devoted attention to its intricacies from the vantage point of a Venetian gondola as when Alex was in the more prosaic surroundings of Long Acre.

All was not lost, however. Some nifty Logo programming, a quick patch to the second processor, a *CLONE and hey presto! Alex's double appeared on the scene in a cloud of solder. Thus the real Alex was able to swan off to Venice for a week leaving the clone free to roam the Redwood building muttering to himself and cursing Acorn Computers and all associated with them – and generally behave in a fashion indistinguishable from the genuine article. Upon his return the real Alex did the decent thing and consigned the clone to the *Acorn User* dungeon, which is where you, gentle reader, come in. Although the clone looks and behaves like its maker, Alex built one piece of software protection into the system – his earrings fashioned out of silicon chips. The only difference between the two (undiscernible to the naked eye, of course) is that when Mad Alex's earring is a RAM chip he's telling you the truth and when it's a ROM he's lying to you. By contrast, if the clone wears a RAM chip he's telling you a lie and if it's a ROM he's telling you the truth. For three days you visit the pair of them in the dungeon in an attempt to obtain the secret combination to the Techno Torture chamber, (described by Joe Telford in May's *Acorn User*), where the prize of 10 copies of *Sleuth*, Beebugsoft's new debugging ROM worth £29 each, awaits.

First, as usual, you must solve the puzzles. In each case 'age' always means a whole number of years and the solution is the youngest possible which will fulfil the conditions. Moreover, in each case, no two children ever share the same age.

1. Three families containing two, three and three children respectively find that the sum of their children's ages is the same, as is the sum of the squares of their children's ages. What is the age of the elder child in the family with two children?

2. Three families have three children each. The sum of their ages is the same in each case, as is the product of their ages. What is the sum of the ages of the eldest child from all three families?

3. Two families have two and three children; again, the sum of the ages is the same for each family; so is the sum of the cubes of their ages. What is the sum of the ages of all five children?

Your starting number is the product of all three solutions. Thereafter each day when you visit the dungeon you must do exactly what Mad Alex – and only Mad Alex – tells you.

Day one

A: At least one of our earrings is a ROM. Multiply your number by the solution to question one.

B: That's right! Subtract the solution to question one from your number.

A: I am Alex.

Day two

A: I am Alex. Add the solution to question two to your number.

B: I am Alex. Subtract the solution to question two from your number.

A: My clone's earring is a RAM.

Day three

A: Both our earrings are ROMs. Add the solution to question three to your number.

B: That's not true! Subtract the solution to question three from your number.

By now you should have the combination number. What is it? Answers on a postcard please to September Competition, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH, to arrive not later than 4 October 1985.



Sleuth: for the 10 lucky winners

May winners

MAY's competition was a toughie which brought in just under 400 entries, about 70 per cent correct. There were two printing errors (corrected in the June issue) but most of you had already spotted them. The solutions were as follows:

Page 11 Based on Inkey values spelling Acorn Computers Ltd. (240)

Page 15 Anagram of 'Baud rate not guaranteed by *FX6,7' (19200). This one caused the most difficulty

Page 45 Format = 20,508

These three could all be gleaned from the user manual for the Beeb

Page 59 Prime numbers. 25,575

Page 61 Hex sum = 170042

Page 63 10,000

Page 97 Morse code asking how many programmable keys on a Beeb (16)

Page 114 Mozart should have equalled 41 but 'Schubert = 8.5' gave the game away. Beethoven wrote 9 symphonies

Page 115 Goals. Answer = 2

Page 127 ANNE = 1332

Page 139 ASCII. Using CHR$ you get TBONTBTIT ('To be or not to be . . .'). ASCII for Q = 81

Page 108 The first program is a straightforward letter substitution code giving you hints and tips. The second program tells you how to put the answers together (consistently using the Shift key wrongly for the mathematical signs) and the correct solution was 930853.

Congratulations to all those who got there and to the lucky winners of a second processor and Plus 3, Howard Grahame of London and Tony Dodd of Bolton.

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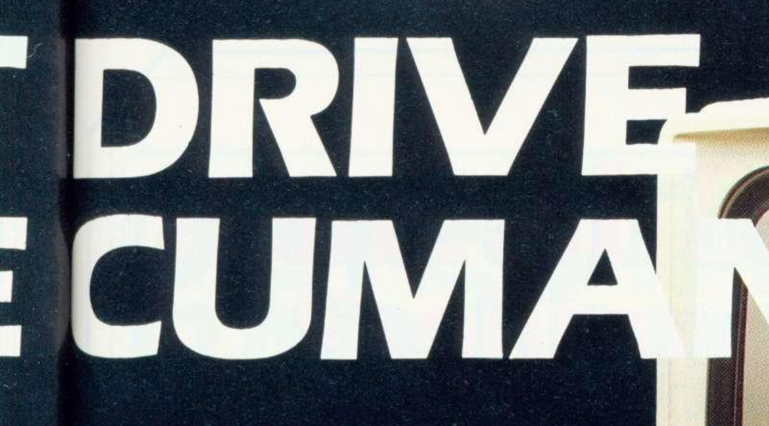
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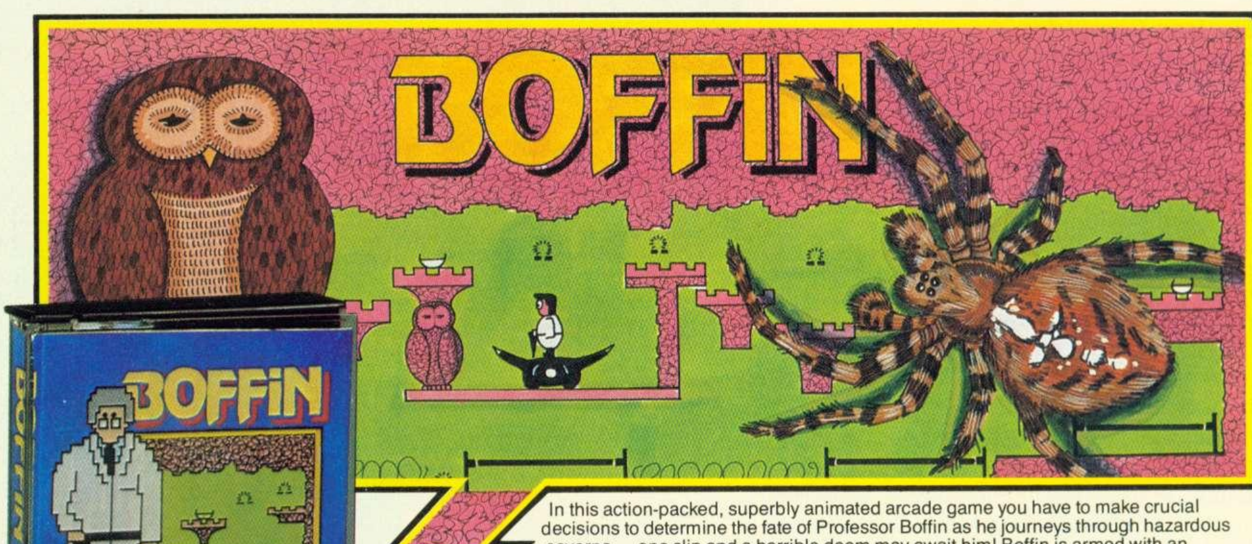
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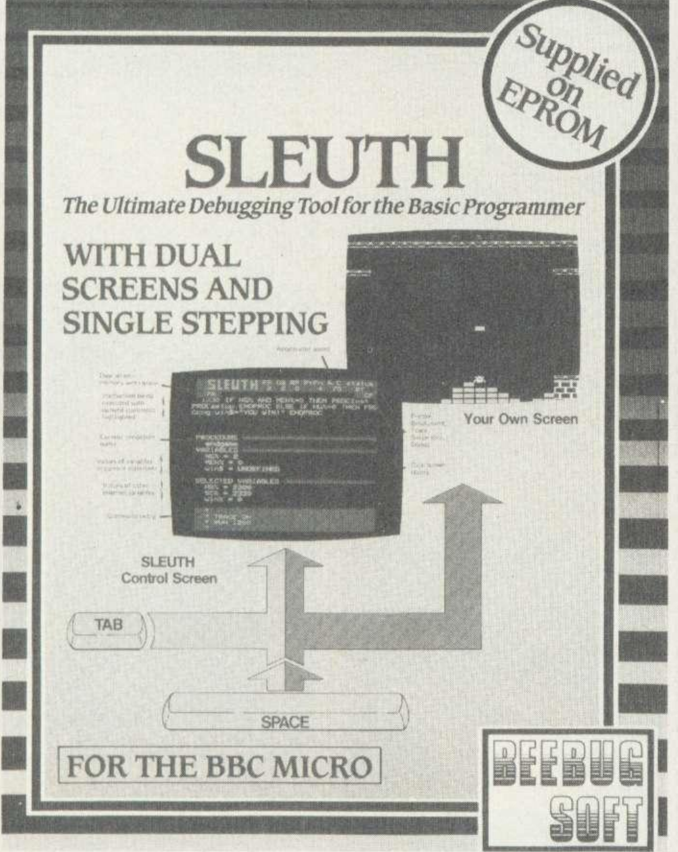


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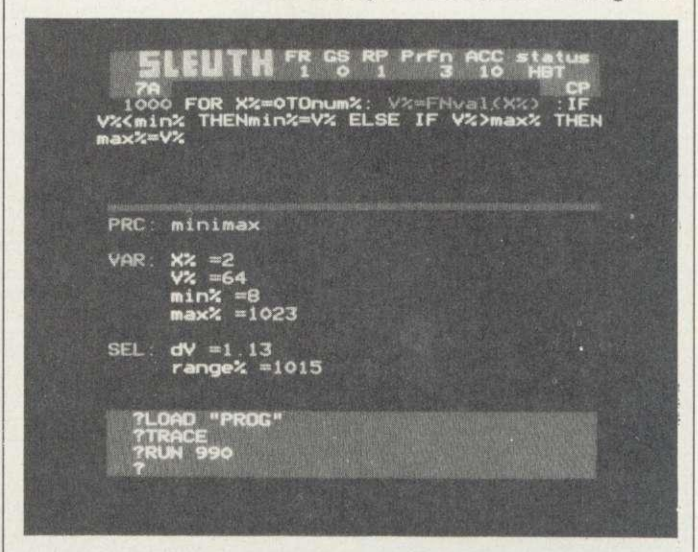


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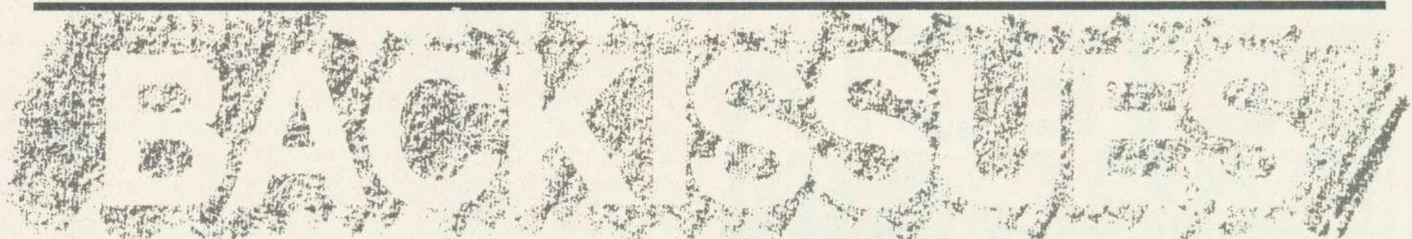
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1. July/August 1982 The first issue. Articles on drawing techniques. The BBC Computer Programme. Machine code graphics. Questions & answers. Hints and Tips. Sound. Interfacing scientific instruments. Dumb Terminals for 0.1 machines. Disc drives. Econet in schools.

2. September Ceefax telesoftware. Beeb in business. Mailing list. Simple files. 30-Hour Basic course. Art on a micro. Music. BBC micro as a key-



board. Extra Atom commands. BBC Basic board. ULA design. Teletext graphics. Machine code graphics. Analogue input. Schools training. 0.1 cassette bug patch.

3. October Electron details. BBC TV series – confessions. Two Epson graphics dumps. Seikosha GP100 dump. Worldwide networking for BBC micro. Garbage handling. Voice ROMs. Sound pitch envelope. Moving graphics. ZX printer for Atom. RGB colour separations for Atom. Biofeedback. Book reviews.

4. November Teletext. Second BBC TV series. Machine code series 1. Programming forum. *Trek III*. Speeding up graphics. Bomber game listing. 7-tone Epson graphics dump. Atom graphics manipulation. Dumb terminal for 0.1 machine. Firework graphics. Editing tips.



5. December BBC TV in schools. Machine code 2 – registers. Programming forum. Program generators. Carols. Hints & Tips. Logo and Turtle graphics in schools. Introduction to procedures. Software review. Atom word processing. Toolbox review. 16-colour graphics on model A. Sorting. Sound envelope design.

6. January 1983 MEP school launch. *FX commands for sound. Second BBC TV series. Machine code 3 – two pass assembly. Disc drives for the Beeb. Programming forum. Program protection. Micros in schools – new series. Commodore Pet printer used with Beeb. BBC programs written on an Atom. Extra Atom memory.

7. February 1 MHz bus examined (4). 3D Atom graphics (3). Atom BBC Board reviewed (3). Machine code 4 – memory (5). BBC Computer Literacy update (1). Atom error handling (2). Micros in schools 2 – getting organised (6). Hints and Tips (4). Beeb Forum (3). Reviews of *Wordwise* (2) and the Amber printer (1).

8. March Chess on the BBC micro (3). Sound on the Beeb (4). Printers for beginners (4). Atom analogue converter (2). Schools 3 – micros and maths (6). Machine code 5 – indirect addressing (3). DIY lightpen (5). MEP's *Microprimer* review (2). Atom Ross toolkit review (1). Beeb Forum (2). Assembly language and Pascal book reviews (2).



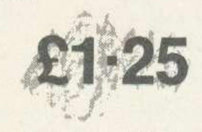
9. April *Hexangle* game listing (4). Bach on the Beeb (4). Hints & Tips on disc drives (4). Machine code 6 – the CALL statement (4). Interfacing the 1 MHz bus (3). Schools 4 – young children and micros (6). Graphics listings (2). Printers for beginners 2 (4). Reviews of BCPL, educational software and Atom software (3).

10. May Review of Basic II(1). Graphics listings(1). New *FX calls in OS1.2(1). Colour mixing on the Beeb(4). Jazz, blues and folk on the BBC(6). Schools 5 – language development(6). DIY Beeb interface box(4). Atom sound board(5). A to Z of printing: how to get going(4). Hints and Tips: PROCs, discs and FNs(5). Printer, software and book reviews.

11. June Techniques series – sorting(2). Hints and Tips: 50p network(5). Drawing techniques and CAD(5). Machine code: interrupts(6). Schools 6 – information technology. Atom Forum. Beeb Forum. Printers – write your own graphics dumps(4). Comparative review of *View* and *Wordwise*(3). Three graphics packages reviewed(3). Test of *Acorn User*'s interface box(4).

12. July Techniques – hash tables(2). Hints and Tips: logic made easy(5). Recursion and graphics(6). Handling strings(3). Two ideas for passing variables(2). Beeb aids the blind(2). DIY second keyboard(5). Beeb Forum. Sounds on the Atom(2). Hardware, firmware, software and book reviews. Atom Forum.

13. August Printer graphics and dumps(2). Techniques – Tree structures and sorting(2). All the fun of the fair(7). 40/80 disc copier(2). Colour painting(5). Basic II: random access files(2). Screen dumps for Olivetti, Centronics and Seikosha(5). Atom strings(3). Reviews of Tandy CGP115 printer, five educational packs, A to D converter.

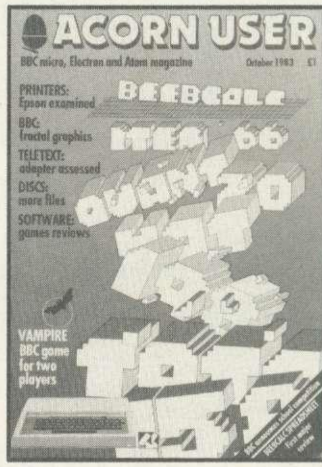


14. September Techniques – ink-blots and mazes. Painting by lightpen. DFS space explored. Beeb Forum. *Mega*



Monsters game listing. Machine code graphics dumps. Atom Forum. Atom cassette recorder check. Reviews of Atom RAM boards, Cumana disc manual, *Logo* for schools, Hobbit floppy tape and books.

15. October Women and computing. Techniques – random numbers. Review of Computer Concepts' *Beebcalc*.



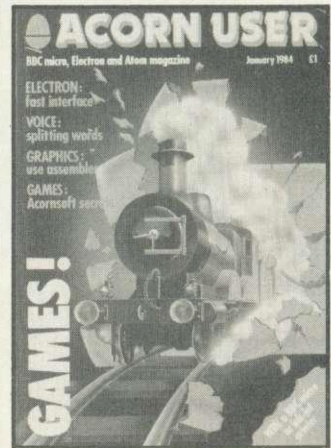
Fractal graphics. 57 files on 40 & 80 track discs. *Vampire* game listing. Beeb Forum. Assembly code controls tab key. Osfile merging. Atom future. Atom verify routine. Reviews of *Vu-Type*, Procyon Atom book, Epson FX80, Teletext adapter, disc drive, software.

16. November Techniques – impossible problems. Contour graphics. Connecting two Beebs together. XREF: sorts & lists variable, function and procedure names. Assembler utilities in Basic II. OS, VDU, *FX, OSBYTE calls – **pull-out poster**. Disc overlays. Adding extra Atom commands. Reviews of 7 educational packs, Atom ROM, books, games.



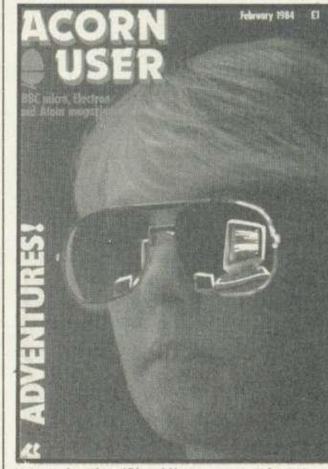
17. December Random graphics. Animated graphics in colour. Techniques – graphs. Hints & Tips. Universal printer dump. 6522 connected to the Electron. Saving machine code. Beeb Forum. Graphics **pull-out poster**. **Index:** July 82–July 83. Forum Extra: EQUS. BBC helps the disabled. Schools – data processing. Transferring data between Beebs, Atoms . . . or Pets. Atom block demolition utility. Atom disassembler program. Reviews of software, books, educational programs from Chalksoft.

18. January 1984: Games special issue Techniques – graphs part 2. Stacks and queues, Basic and languages. Hints & Tips. Voice chip revealed. How to write games. Electron interfacing. Beeb Forum. Life graphics routines. *Defencecom* game listing. *The Train Game* listing. Machine code graphics. Where to put machine code. Schools – handling data. Juki daisywheel printer examined. Atom Forum and adventure.



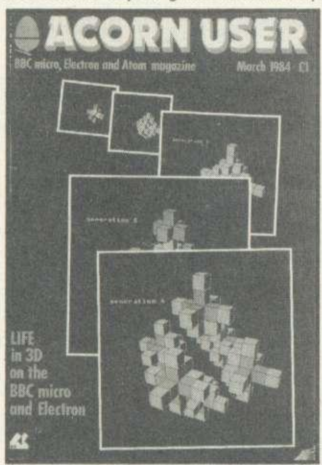
Reviews of utilities, software, *Beeline* wordprocessor, educational packages, two chess programs.

19. February: Adventures special issue Techniques – efficient sorts(3). PROC for a numeric keypad on the Beeb keyboard(1). 12 graphics listings(1). Random access filing on disc(5). Locking files(2). MCP40 printer/plotter looked at(5). Hints & Tips(3). Beeb Forum(2). Make discs readable on 40 and 80 track drives(4). Screen memory



organisation(3). Hints on adventure design(3). Adventure action(4). Adventure ideas in computer language(2). Text compression(2). Word-crunch-

ing(4). VIA chip on Electron to drive a parallel printer(3). Atom Forum(2). Schools – simulation packages(4). Reviews: *Disc Doctor*, Leasalink's DFS upgrade, Hitachi's microdrive system, Solidisk's sideway RAM board, software.
20. March Utility: timing routine. Fractals. Teletext and mode 7 dump. ROMs reviewed. Hints & Tips. Beeb Forum. Add sounds to your games. Learn Lisp



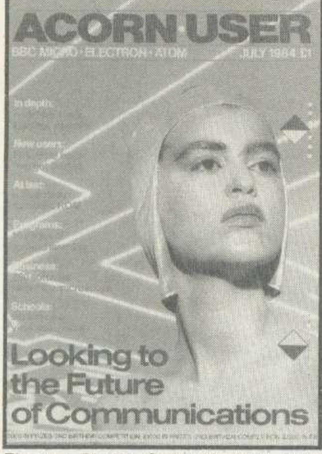
1. Cube graphics. Printer driver for View. Basic II from Basic I. Beeb's ADC chip. Atom Forum. Listing formatter for the Atom. Atom 'bytes free' routine. Schools – test of *Factfile*. Keyboard skills. Amcom DFS v Acorn DFS. Reviews: *Beebpen* wordprocessor, Atom expansion system, software, books.
21. April Beeb graphics on TV(3). 6845 chip explored(3). Advanced filing systems(1). Lisp 2(4). Hints & Tips(3). Beeb Forum(4). Choose disc tracks to copy(4). Function key editing(4). Teletext dumps(3). CES scrutinised(3). Passing variables(2). Computer Concepts' graphics ROM(4). Schools – simulations(4). Calculating Easter dates(3). Better programming(3). Atom Forum(2). Atom ROM routines(5). Converting BBC to Atom Basic(2). Three printers compared(2). Reviews: software, Aries B20 RAM board, *Toolkit*, Monitors.



22. May Bitstik graphics system. Hints & Tips. 6502 second processor examined. Lisp 3. Beeb Forum. Disc utility to keep track of available space. Statistics. Pattern graphics. OSWORD explained. 4 colour graphics listings. Second-hand



disc drives. Education – do girls get a fair deal? Atom Forum. BBC to Atom Basic 2. Reviews: British Micro's Grafpad, *Edword* wordprocessor, 4 sprite generators, Opus microdrive, Beasty, software.
23. June Acorn Z80 second processor(3). Forth(2). Graphics to brighten up your games(2). Soft Pottery graphics(4). Go faster and save memory space(3). Rapid search and load routine for tapes(2). How the Beeb and Electron work 1(3). Business: reviews and how to gently enter office computerisation(4). Education – adult literacy(3). Dumping Atom programs on the BBC(2). Atom Forum. Software copyright laws(2). Hints & Tips(4). Techniques – B-Trees(3). Beeb Forum(2). Reviews of monitors, printers, books, software, adventures, EPROM programmer.
24. July Communications: the future; portable micros; modems & electronic mail. Hints & Tips. First Byte: using your micro. Beeb Forum on Basic. How it works II: slow down the Beeb. Business: Acorn's Z80 software, Starbase ROM. Education: a look at Edfax, how to teach facts. Atom Forum. Converting BBC to Atom Basic. Reviews:



Electron Plus-1, Solidisk's 128k RAM board, three IEEE interfaces, Canon colour and Brother printers, ADE ROM.
25. August Downloading the weather. Teaching tots: keyboard overlays, activity board. First Byte: writing & debugging programs. Hints & Tips. Beeb Forum: 6502 second processor & Tube tips. How it works III: random numbers. Business: Plan software for Z80. Atom Forum, avoiding errors. Reviews: 3 drawing packs, Torch Unicomm, MCP's Interbeeb, software plus for Micronet.
26. September Decoding radio signals, First Byte: getting moving. Hints & Tips.



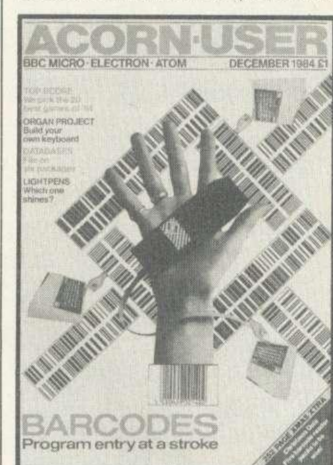
Education: problem solving. Sprite design and animation part I. Beeb Forum: fastest dump. Write your own disc formatter. How it works IV: random number generator. Business: Nucleus software for Z80, accounts. Atom Forum, ? and !. Reviews: Torch Unicorn, Quinkey, Parfitt plotter, Turbo compiler, Multi-aid.



27. October The BBC and space. First Byte: noises on the Elk. Hints & Tips. Sprite design and animation part II. Programming the 8271. Sorting techniques. Diagnosing ills in the Beeb. Beeb Forum: NFS update. Education: report on government scheme, review of Microtext. Atom: wordprocessor. Communications: bulletin boards. Reviews: Basic utility ROMs, sideways ROM sockets, Bearsoft's Editor, Watford's Buffer & Backup, Ampersand's Colour module.
28. November Acorn's ABC range. First Byte: drawing. Hints & Tips: 3D-effect printing. Sprite design and animation part III. Floating point variables. ROM juggler. *Micro Live*. Education: news, Edword in the classroom, school quiz. Atom forum: hardware, the Auto command. Reviews: Six turtles and buggies. Toad's extension socket, Watford's Speech Synthesiser and



Beebfont ROM, BBtype, Romex 13 ROM board, 3 language coaching packs, two graphics tablets.
29. December Guide to bar codes. First Byte: text & graphics windows. Hints & Tips: control codes for Epsons. The Domesday project. Low-cost keyboard for the Beeb. Dumping games' screens. Speed up your micro. DIY database. Education: news, science quiz, review



of the Dudley suite of software. Atom: Forum, build a ROM pager, competition. Reviews: 6 databases compared, part I of lightpens, Acornsoft's Logo and Pascal, best games of 1984.
30. January 1985 Games special: Quadline, Picture Puzzle, musical tunes. Colourfill graphics. Hints & Tips. Operation



Raleigh report. Setting up your own teletext database. Second processors examined. Education: news, activity board revisited. Reviews: 6 wordprocessors compared, three astronomy packs, software for lightpens.

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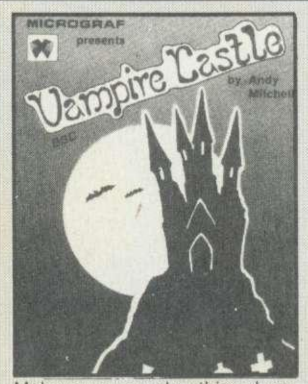
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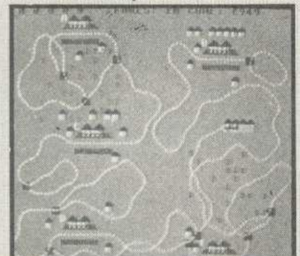
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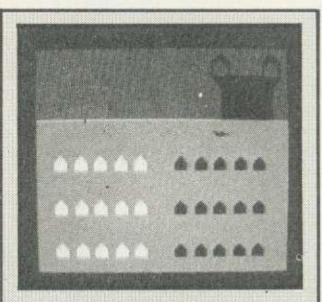


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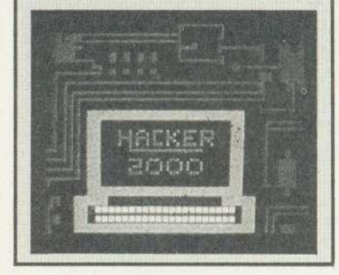


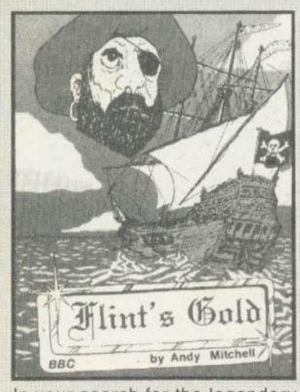
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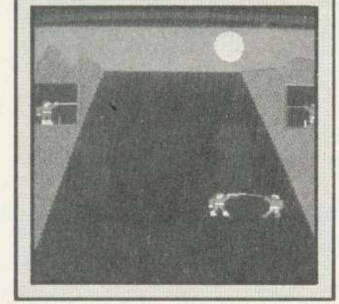




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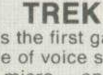
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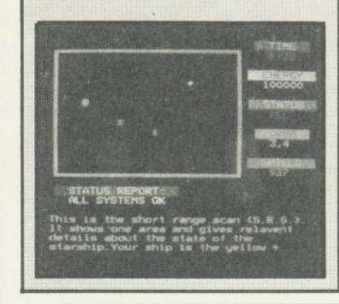
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GRAFPAK
GRAFPAK is a mode 7 graphics utility incorporating machine code routines not available in other packages, eg Draw, Plot, Fill. It's easy to use and provides a useful tool for the construction of advanced teletext graphics for games, or any other software.
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	Listing 2	99	●	●	●	●
Runplot:	Listing 1	103	●	●	●	●
Disloc:	Listing 1	104	●	●	●	
Wordwise Edit:	Listing 1	107	●	●		
ViewSuite:	Listing 1	108	●	●	●	●
Clone:	Listing 1	109	●	●	●	●*

** With Plus 3*

Listing 1. Menu Creator program

```
10 REM Automenu creator program
20 REM By Martin Phillips
30 REM For BBC DFS 0.9, 1,2 and 2.0
40 REM (c) Acorn User Sept 1985
50 :
60 *KEY10 O.|MRUN|M
70 *LOAD AUTOMNU 5000
80 title$=CHR$(129)
90 DIM C 200
100 MODE7
110 VDU23;8202;0;0;0;
120 VDU134,157,132,141
130 PRINTTAB(5)"Automatic Menu Creator"
140 VDU134,157,132,141
150 PRINTTAB(5)"Automatic Menu Creator"
160 FOR N=2 TO 24
170 PRINTTAB(0,N) CHR$(132) CHR$(157) C
HR$(134);
180 NEXT N
190 VDU28,3,23,39,3
200 IF LEN(title$)>1 THEN GOTO 320
210 PRINT"This program will put an auto
matic"
220 PRINTTAB(10)"menu on a disc."
230 PRINT'"Enter title for disc menu"
240 REPEAT T$=GET$
250 IF T$=CHR$(127) THEN title$=LEFT$(t
itle$,LEN(title$)-1):GOTO270
260 IF LEN(title$)<30 AND T$>=" " THEN
title$=title$+T$:ELSE VDU7
270 PRINTTAB(0,4)title$" ";
280 UNTIL T$=CHR$(13)
290 FOR N=0 TO 30-LEN(title$) STEP 2
300 title$=" "+title$+" "
310 NEXT N
320 CLS
330 PRINTtitle$
340 *FX15,0
350 PRINT'"Now remove the menu creation
 disc"
360 PRINT"and put your disc into the di
sc"
370 PRINT"drive"
380 PRINT''"Press space bar when ready"
390 REPEAT UNTIL GET = 32
400 ON ERROR GOTO 630
410 PRINT''"        SAVING MENU PROGRAM"
420 PROCoscli("OPT4,3")
430 PROCoscli("SPOOL !BOOT")
440 PRINT"*FX15,0"
450 PRINT"CH.""AUTOMNU"""
460 PRINTCHR$(27)
470 PROCoscli("SPOOL")
480 M=&500D:$M=title$
490 N=LEN(title$)
500 N?M=32
510 PROCoscli("SAVE AUTOMNU 5000 +C00")
520 CLS
530 PRINTTAB(12,8)"MENU CREATED"
540 END
550 :
560 DEFPROCoscli(O$)
570 $C=O$
```

Continued ►

◄ Continued

```
580 X%=C MOD 256
590 Y%=C DIV 256
600 CALL &FFF7
610 ENDPROC
620 :
630 SOUND 1,-15,125,10
640 IF ERR=17 THEN VDU26,12:END
650 PRINT''"An error has occurred:"
660 REPORT
670 PRINT''"Press space bar when ready"
680 REPEAT:A$=GET$:UNTIL A$=" "
690 GOTO100
```

Listing 2. Automatic menu program

```
10 title$=" A B C D E F G H I J K L M N
 O P "
20 REM Automenu program
30 REM by Martin Phillips
40 REM For BBC with DFS 0.9, 1.2 or 2.0
50 REM (c) Acorn User Sept 1985
60 :
70 MODE 7
80 PROCinitialise
90 PROCsetscreen
100 PROCprintcat
110 PROCselect
120 END
130 :
140 DEFPROCinitialise
150 ON ERROR PROCerror
160 *KEY0 MODE7|M|NL.|M
170 S%=0:T%=0
180 DIM prog$(30),dir$(30),type(30)
190 DIM file$(30),C 30
200 PROCcat
210 track%=((?&F06 AND 3)*256 +?&F07)/10
220 drive%=?&1046
230 ENDPROC
240 :
250 DEFPROCsetscreen
260 VDU134,157,132,141;:PRINTtitle$
270 VDU134,157,132,141;:PRINTtitle$
280 FOR N=0 TO 20
290 VDU132,157,(134 +N DIV 17):PRINT
300 NEXT N
310 VDU134,157,132:PRINT
320 VDU134,157,132
330 PRINTTAB(3,24)"Program types:";
340 PRINT CHR$(129)"Basic,";
350 PRINT CHR$(133)"machine code";
360 ENDPROC
370 :
380 DEFPROCprintcat
390 PRINTTAB(3,23);track%;" track disc";
400 IF track%=40 THEN GOTO 430
410 PRINT" TAB to see drive ";
420 PRINT;(drive%+2) MOD 4
430 IF T%=0 THEN GOTO 510
440 FOR N=0 TO T%-1
450 x%=3+(19*(N DIV15))
460 y%=3+(N MOD 15)
470 PRINTTAB(x%,y%)CHR$(134)CHR$(65+N);
480 IF type(N)=&80 PRINTCHR$(129);:ELSE
PRINTCHR$(133);
490 PRINTprog$(N)
500 NEXT N
510 IF S%=0 THEN GOTO 580
520 FOR N=T% TO T%+S%-1
530 x%=3+(19*(N DIV15))
540 y%=3+(N MOD 15)
550 IF file$(N-T%)="$.!BOOT   " THEN GOTO
 570
560 PRINTTAB(x%,y%)CHR$(131)"file: "file
$(N-T%)
570 NEXT N
580 ENDPROC
590 :
600 DEFPROCselect
610 *FX15,0
620 VDU28,3,21,39,19,12
630 IF T%=0 THEN PROCend:ENDPROC
640 IF T%=1 THEN PRINT"Press key A to lo
ad the program":GOTO 660
```

Continued ►

See 'That Sinking Feeling', page 72

◀ Automatic menu program continued

```
  650 PRINT"Select a letter (A-";CHR$(64+T
%);")"
  660 *FX4,1
  670 A=GET
  680 IF A=135 THEN PROCcopy:GOTO 670
  690 *FX4,0
  700 IF A=9 THEN PROCoscli("DRIVE "+CHR$(
48+(drive%+2)MOD4)):RUN
  710 IF A<65 OR A>(64+T%) THEN GOTO 660
  720 PROCoscli("DIR "+dir$(A-65))
  730 IF type(A-65)=&80 THEN VDU26,12:CHAI
N prog$(A-65)
  740 PRINT"*LOAD or *RUN (L/R)? "
  750 REPEAT:B=GET:UNTIL B=82 OR B=76
  760 IF B=82 THEN PROCoscli("RUN "+prog$(
A-65))
  770 PROCoscli("LOAD "+prog$(A-65))
  780 ENDPROC
  790 :
  800 DEFPROCcat
  810 ?&A00=0:!&A01=&A10:X%=0:Y%=&A:A%=5
  820 CALL&FFD1
  830 FORI%=0TO(?&F05)-8 STEP8
  840 IF I%?&F0B=0 OR I%?&F0B=&FF THEN PRO
Ccatfiles:GOTO 860
  850 PROCcatprogs
  860 NEXT I%
  870 ENDPROC
  880 :
  890 DEFPROCoscli(O$)
  900 $C=O$:X%=C MOD256
  910 Y%=C DIV256:CALL&FFF7
  920 ENDPROC
  930 :
  940 DEFPROCcatfiles
  950 A$=""
  960 FOR J%=1 TO 7
  970 A$=A$+CHR$(?(J%+I%+&E07))
  980 NEXT J%
  990 IF A$= "!BOOT  " THEN ENDPROC
 1000 file$(S%)=CHR$((I%?&E0F)MOD128)+"."+
A$
 1010 S%=S%+1
 1020 ENDPROC
 1030 :
 1040 DEFPROCcatprogs
 1050 n=(I%?&E0F)MOD128
 1060 dir$(T%)=CHR$(n)
 1070 A$=""
 1080 FOR J%=1 TO 7
 1090 A$=A$+CHR$(?(J%+I%+&E07))
 1100 NEXT J%
 1110 IF A$="AUTOMNU" THEN ENDPROC
 1120 W%=I%?&F09
 1130 IF W%=&58 OR W%=&30 OR W%=&7C THEN E
NDPROC
 1140 prog$(T%)=A$
 1150 type(T%)=I%?&F0B
 1160 T%=T%+1
 1170 ENDPROC
 1180 :
 1190 DEFPROCerror
 1200 IF ERR=17 THEN VDU26,12:END
 1210 CLS
 1220 *DRIVE 0
 1230 PROCsetscreen
 1240 VDU28,3,22,39,20
 1250 REPORT
 1260 PRINT'"Press space to continue"
 1270 REPEAT:UNTIL GET=32
 1280 RUN
 1290 :
 1300 DEFPROCend
 1310 PRINT"This disc has no programs on i
t"
 1320 PRINT'"Press space to end";
 1330 REPEAT UNTIL GET=32
 1340 VDU26,12
 1350 ENDPROC
 1360 :
 1370 DEFPROCcopy
 1380 *FX3,10
 1390 PRINTtitle$'
 1400 FOR N=0 TO T%-1 STEP 2
 1410 PRINTprog$(N);TAB(20)prog$(N+1)
 1420 NEXT N
 1430 PRINT
 1440 FOR N=0 TO S%-1 STEP 2
 1450 PRINTfile$(N);TAB(20)file$(N+1)
 1460 NEXT N
```

Continued ▶

◀ Continued

```
 1470 PRINT';track%;" track disc"
 1480 PRINT''''
 1490 *FX3,0
 1500 ENDPROC
```

Run silent, run deep program notes

LISTING 1 contains the pre-loading instructions plus sound and envelope data. This should be entered first and saved to tape or disc. Once saved, try running the program. If all is well a short animated sequence should take place followed by the loading message.

If everything's correct, enter listing 2. This is somewhat longer and a line-by-line checksum is provided on page 102. Once your own figures tally save this to tape (immediately after part 1) or disc.

To set the game in motion simply chain the first part, ie:

CHAIN "SUB"

where SUB is the filename for part 1.

Note that the first program will reset page to &1100, so if you should abort the program at any point, reset page to its normal value for your machine to restore the original. The value of page can be found by typing:

PRINT ~PAGE

Electron conversions

Run silent, run deep will work on the Electron. Listing 1 is intended primarily for use with the BBC micro's mode 7 screen, so much of it will become redundant. The changes and deletions required are as follows:

- Change MODE 7 in line 80 to MODE 6.
- Delete lines 90 to 410 inclusive.
- Change line 420 and 430 to:

```
420 PRINT SPC(10); "Run Silent, Run Deep"
430 PRINT ''
```

- Change line 860 to read:

```
860 VDU 30
```

- Change line 870 to read:

```
870 PRINT TAB(0,(K% + 4));
```

- Delete line 890.
- Delete lines 960 to 1110 inclusive.

Program 2 can be entered exactly as shown. Please refer to the notes above. Happy hunting!

Listing 1. The pre-loading instructions for Run silent, run deep

```
 10 REM Run Silent, Run Deep
 20 REM By Phil Martin
 30 REM BBC B/B+/6502/Electron
 40 REM (C) Acorn User September 1985
 50 :
 60 PROCsetup
 70 :
 80 MODE7:VDU23,1,0;0;0;0;
 90 PROCtitle("Run Silent, Run Deep")
100 FOR K%=3 TO 18
110 PRINTTAB(0,K%)CHR$(132);CHR$(157);C
```

Continued ▶

◀ *Run silent, run deep listing 1 continued*

```
HR$(158)
  120 NEXT K%
  130 FOR K%=19 TO 20
  140 PRINTTAB(0,K%)CHR$(141);CHR$(134);
  150 PROCcentre("You've seen the film,",
K%)
  160 NEXT K%
  170 FOR K%=21 TO 22
  180 PRINTTAB(0,K%)CHR$(141);CHR$(134);
  190 PROCcentre("now play the game.",K%)
  200 NEXT K%
  210 VDU28,0,14,39,7
  220 A%=INKEY(100)
  230 FOR Y%=0 TO 5
  240 FOR X%=2 TO 36 STEP4
  250 READC%
  260 B%=(C%AND&FFFF0000)DIV&10000
  270 A%=C%MOD&10000
  280 IF A%=0 A%=&FFFF
  290 IF B%=0 B%=&FFFF
  300 VDU31,X%,7,A%;B%;
  310 NEXT X%
  320 *FX19
  330 VDU31,0,7,148,255
  340 VDU31,38,7,255,255,148,157
  350 A%=INKEY(50)
  360 NEXT Y%
  370 VDU26
  380 :
  390 A%=INKEY(500)
  400 :
  410 MODE7
  420 PROCtitle("Run Silent, Run Deep")
  430 FOR K%=3 TO 4
  440 PRINTTAB(0,K%)CHR$134;CHR$141;
  450 PROCcentre("CONTROLS",VPOS)
  460 NEXT K%
  470 K%=5
  480 REPEAT:READ T$:K%=K%+1
  490 IF T$<>"<nl>" AND T$<>"<end>" PROCj
ustify(T$,K%)
  500 UNTIL T$="<end>"
  510 VDU23,1,1;0;0;0;
  520 VDU28,8,24,34,20
  530 PRINT"Loading Game"
  540 PAGE=&1100
  550 CHAIN"RUN2"
  560 END
  570 :
  580 DEF PROCsetup
  590 VDU23,230,224,160,224,96,96,96,0,0
  600 VDU23,231,96,&F0F0;96,0;0;
  610 VDU23,232,16,16,48,56,252,127,63,0
  620 VDU23,233,8,8,12,28,63,254,252,0
  630 VDU23,234,56,56,108,124,68,124,56,1
6
  640 VDU23,235,8,20,54,62,42,62,42,62
  650 VDU23,236,3,7,14,156,248,240,240,24
8
  660 VDU23,237,16,48,112,255,255,112,48,
16
  670 VDU23,238,248,240,240,248,256,14,7,
3
  680 VDU23,239,24,24,24,24,255,126,60,24
  690 VDU23,240,24,60,102,219,219,102,60,
24
  700 VDU23,241,24,60,126,255,24,24,24,24
  710 VDU23,242,192,224,112,57,31,15,15,3
1
  720 VDU23,243,8,12,14,255,255,14,12,8
  730 VDU23,244,31,15,15,31,57,112,224,19
2
  740 REM  Bleep, echos and explosions
  750 ENVELOPE1,1,0,0,0,3,3,3,126,-4,-1,-
5,126,0
  760 ENVELOPE2,1,0,0,0,3,3,3,75,-1,-1,-2
,100,0
  770 ENVELOPE3,2,0,1,-1,3,3,3,40,-1,0,-2
,70,30
  780 ENVELOPE4,2,0,0,0,3,3,3,126,-1,0,-1
,126,80
  790 ENDPROC
  800 :
  810 DEF PROCcentre(A$,vpos)
  820 PRINTTAB((20-LENA$DIV2),vpos);A$;
  830 ENDPROC
  840 :
  850 DEF PROCtitle(A$)
```

Continued ▶

◀ *Continued*

```
  860 VDU30:FOR K%=0 TO 1
  870 PRINTTAB(0,K%)CHR$(129);CHR$(157);C
HR$(131);CHR$(141);
  880 PROCcentre(A$,VPOS)
  890 NEXT K%
  900 ENDPROC
  910 :
  920 DEF PROCjustify(S$,vpos)
  930 PRINTTAB(12-INSTR(S$,"-"),vpos)S$
  940 ENDPROC
  950 :
  960 REM  Picture data
  970 DATA0,0,0
  980 DATA0,&6AFF2FFF,0
  990 DATA0,0,0,0,0,0
 1000 DATA0,&6AFF35FF,0
 1010 DATA0,0,0,0,0,0
 1020 DATA0,&6A2F35FF,0
 1030 DATA0,0,0,0,0,0
 1040 DATA&35FFFFFF,&6A202020,0
 1050 DATA0,0,0,0,0,0
 1060 DATA&35FFFFFF,&6A945587,0
 1070 DATA0,0,&FF2037FF
 1080 DATA0,&60602F2F,&2D2D8660
 1090 DATA&2020202D,&20202020,&2D202020
 1100 DATA&942D2D2D,&60606060,&FF202060
 1110 :
 1120 REM  Controls Data
 1130 DATA"Z - Ship Thrust Left"
 1140 DATA"X - Ship Thrust Right"
 1150 DATA"* - Ship Thrust Up"
 1160 DATA"? - Ship Thrust Down"
 1170 DATA"<nl>"
 1180 DATA"<space> - Drop Depth Charge"
 1190 DATA"<nl>"
 1200 DATA"<return> - Drop Marker Bouy"
 1210 DATA"<nl>"
 1220 DATA"<up> - Set charge depth higher
"
 1230 DATA"<down> - Set charge depth lowe
r"
 1240 DATA"<nl>"
 1250 DATA"T - Time left"
 1260 DATA"<end>"
```

Listing 2. Phil Martin's Run silent, run deep game

```
    1 REM Listing 2
   10 REM  Run Silent, Run Deep
   20 REM  by Phil Martin
   30 REM  BBC B/B+/6502/Electron
   40 REM  (C) Acorn User September 1985
   50 :
   60 ON ERROR GOTO 500
   70 PROCinit
   80 REPEAT
   90 S%=0:D%=100:pg%=0:CLS
  100 REPEAT
  110 PROCreset
  120 MODE1:PROCscreen
  130 :
  140 REPEAT
  150 PROCship(X%,Y%):IF K% GOTO250
  160 IF INKEY(-98) xv=xv-a:ch%=0
  170 IF INKEY(-67) xv=xv+a:ch%=1
  180 IF INKEY(-105) yv=yv-a:ch%=2
  190 IF INKEY(-73) yv=yv+a:ch%=3
  200 X%=X%+xv+cx%:Y%=Y%+yv+cy%
  210 IF ABS(X%)>580 X%=-X%
  220 IF ABS(Y%)>460 Y%=-Y%
  230 PROCship(X%,Y%)
  240 xv=xv-SGN(xv)*f:yv=yv-SGN(yv)*f
  250 IF FNinmf(X%,Y%) PROCinmf
  260 PROCsonar(X%,Y%,TIME-T%>300)
  270 IF torp%ANDNOTK% PROCtorp
  280 IF INKEY(-99)ANDNOTB% PROCdrop
  290 IF B% dcdt%=dcdt%+2:IF dcdt%>=W% P
ROCcharge
  300 IF INKEY(-74) PROCbouy(X%,Y%)
  310 IF INKEY(-36) M%=1:m$="Time remain
ing : "+STR$((t%-TIME)DIV100)+" secs"
  320 IF INKEY(-58) PROCdcd(-2)
```

Continued ▶

◀ Run silent, run deep listing 2 continued

```
 330 IF INKEY(-42) PROCdcd(2)
 340 PROCsub
 350 IF O%>0 PROCoil(bx%,by%)
 360 IF E%>0 PROCexpl(bx%,by%)
 370 IF torp% AND NOT K% PROCtorp
 380 UNTIL NOTB% AND (N%=0 OR (E%=0 AND
Q%=speed%)OR(TIME>t% AND E%<1))
 390 :
 400 T%=TIME:S%=S%+FNscore(T%):*FX21,0
 410 PROCbox(-420,-196,416,192,3):VDU28
,7,21,32,10,4,12
 420 UNTIL K%OR(T%>t%)OR(N%=0)
 430 IF K% m$="Your ship was destroyed"
ELSE IFT%>t% m$="Out of time!" ELSE m$=
"Out of charges!"
 440 PRINT;yb$;SPC3"Run Silent, Run Dee
p";SPC3;bb$"Time allowed : ";4*D%;" secs
"
 450 PRINT"Time taken   : ";T%/100''"Ch
arges dropped : ";20-N%'"Markers dropped
 : ";8-mb%
 460 PRINT'yb$;m$;bb$
 470 PROChiscore(S%):PROChitable
 480 UNTIL FALSE
 490 :
 500 VDU4:REPORT:PRINT" at ";ERL:*FX21
 510 END
 520 :
 530 DEF PROCsonar(X%,Y%,S%)
 540 LOCAL dst%,tmp%
 550 IF S% THEN T%=TIME:SOUND2,1,154,2:
Q%=0:F%=FALSE:M%=M%-1:VDU4:COLOUR2:PRINT
TAB(0,31);m$;:VDU5:H%=0:IF M%=0 m$=STRIN
G$(27," ")
 560 Q%=Q%+speed%:dst%=FNhypot(X%-sx,Y%
-sy)
 570 IF NOT F% AND Q%>dst% F%=TRUE:SOUN
D&12,2,154+(L%-dst%)DIV16,4:H%=(256-dst%
)DIV2:G%=16:L%=dst%
 580 IF RND(D%)=1 SOUND3,3,151,5:H%=H%+
RND(8)*10:G%=8
 590 IF pg%>8 ENDPROC
 600 H%=H%+(H%>G%)*G%:dst%=H%+RND(13)-1
 610 tmp%=Q%DIVspeed%:GCOL3,3
 620 MOVE290+Q%,tmp%?&900-456
 630 DRAW290+Q%,-456:tmp%?&900=dst%
 640 DRAW290+Q%,dst%-456:ENDPROC
 650 :
 660 DEF PROCship(X%,Y%):GCOL3,3:MOVEX%
-16,Y%+16:VDU232+ch%:ENDPROC
 670 :
 680 DEF PROCcharge
 690 LOCALH%:N%=N%-1:B%=FALSE
 700 SOUND&10,4,5,25:IFK% ENDPROC
 710 VDU4:COLOUR2:PRINTTAB(15,0);N%;TAB
(35,0);"     ";:VDU5
 720 IF FNhypot(X%-bx%,Y%-by%)<d2% PROC
ds
 730 H%=FNhypot(sx-bx%,sy-by%)
 740 IF H%<D% O%=10:V%=RND(10)*10 ELSE
m$="     IT MISSED!        ":M%=4:ENDPROC
 750 IF bd%>sd%+d2% m$=" Too Deep !":M
%=3:GOTO790
 760 IF bd%<sd%-d2% m$=" Not deep enoug
h ":M%=3:GOTO790
 770 m$="     Depth O.K. Captain":M%=2
 780 IF H%<d2% E%=11:O%=16
 790 ENDPROC
 800 :
 810 DEF PROCsub
 820 IF NOTtorp%AND sd%<30 AND(SGN(X%-s
x)=sxv AND SGN(Y%-sy)=syv) PROClt
 830 IF C%=0 AND RND(200+D%+40*P%)=1 C%
=10+RND(90):Z%=(RND(2)-1.5)*2:IF sd%<15
THEN Z%=1
 840 IF C%>0 C%=C%-1:sd%=sd%+Z%:SOUND0,
-11,3,2
 850 IF sd%>249 Z%=-Z% ELSE IF sd%<10 s
d%=10:C%=0
 860 IF sd%<18 AND NOT P% P%=TRUE:GOTO8
90
 870 IF P% MOVEsx,sy:GCOL3,2:VDU230
 880 IF V%>0 V%=V%-1:GOTO930
 890 sx=sx+sxv:sy=sy+syv
 900 IF FNinmf(sx,sy) IFRND(14+pg%)=1 G
COL1,1:SOUND0,3,5,8:MOVEsx,sy:VDU231
 910 IFABS(sx)>560 sxv=-sxv:syv=FNsv
 920 IFABS(sy)>440 syv=-syv:sxv=FNsv
 930 IF NOT P% ENDPROC
```

Continued ▶

◀ Continued

```
 940 IFP% AND sd%>17 P%=FALSE:ENDPROC
 950 MOVEsx,sy:GCOL3,2:VDU230:ENDPROC
 960 :
 970 DEF PROCoil(X%,Y%)
 980 LOCALx%,y%,l%:O%=O%-1:l%=19-O%:GCO
L1,1
 990 FOR I%=1 TO 3
 1000 x%=X%+(RND(2*l%)-l%)*4:y%=Y%+(RND(
2*l%)-l%)*2
 1010 MOVEx%-8,y%:DRAWx%+8,y%
 1020 NEXT
 1030 ENDPROC
 1040 :
 1050 DEF PROCexpl(X%,Y%)
 1060 LOCALx%,y%:C%=0:E%=E%-1:READx%,y%
 1070 SOUND1,-(x%<>999),x%+(E%=0ANDK%)*4
,y%
 1080 FOR I%=1 TO 4
 1090 x%=X%+(RND(19-O%)-1)*(RND(2)-1.5)*
8:y%=Y%+(RND(19-O%)-1)*4
 1100 IF POINT(x%,y%)=3 GOTO 1090 ELSE G
COL0,3:MOVEX%,Y%:DRAWx%,y%
 1110 NEXT
 1120 ENDPROC
 1130 :
 1140 DEF PROCnsv
 1150 REPEAT:sxv=FNsv:syv=FNsv:UNTILsxv<
>0ORsyv<>0
 1160 ENDPROC
 1170 :
 1180 DEF PROCtorp
 1190 IF torp%=-2 torp%=-1:GOTO1210
 1200 GCOL3,3:MOVEtx%,ty%:PLOT1,-txv%*4,
-tyv%*4
 1210 tx%=tx%+txv%:ty%=ty%+tyv%
 1220 IF ABS(tx%)>570 OR ABS(ty%)>450 to
rp%=FALSE:ENDPROC
 1230 IF ABS(tx%+txv%-X%)<18 AND ABS(ty%
+tyv%-Y%)<18 PROCds
 1240 GCOL3,3:MOVEtx%,ty%:PLOT1,-txv%*4,
-tyv%*4
 1250 ENDPROC
 1260 :
 1270 DEF FNhypot(xd%,yd%)=SQR(xd%*xd%+y
d%*yd%)
 1280 :
 1290 DEF PROCbox(a,b,c,d,lc)
 1300 GCOL 0,lc:MOVE a,b:DRAW a,d
 1310 DRAW c,d:DRAW c,b:DRAW a,b
 1320 ENDPROC
 1330 :
 1340 DEF PROCscreen
 1350 VDU19,0,4;0;19,1,0;0;17,129,12
 1360 PROCbox(68,62,1208,968,3)
 1370 PROCbox(40,36,1236,988,3):VDU29,64
0;512;
 1380 FOR I%=-568 TO 568 STEP71:MOVEI%,-
448:DRAWI%,-476:MOVEI%,452:DRAWI%,476:NE
XT
 1390 FOR I%=-448 TO 448 STEP56:MOVE-572
,I%:DRAW-600,I%:MOVE568,I%:DRAW592,I%:NE
XT
 1400 PRINTTAB(0,0);yb$;"Depth Charges";
bb$;"  ";N%;" Left  Set at ";bd%;yb$
 1410 PROCvert("   Run Silent  Run Deep
",0,2)
 1420 PRINTbb$:PROCvert("PATROL "+STR$pg
%+"  Current "+FNcch,39,3)
 1430 VDU24,-568;-448;564;452;16
 1440 FOR I%=0TO24:PROCcross((I%MOD5-2)*
284,(I%DIV5-2)*224):NEXT
 1450 VDU26:PROCbox(880,0,1276,208,3)
 1460 PROCbox(888,8,1268,200,2)
 1470 VDU24,892;12;1264;196;16
 1480 GCOL0,2:MOVE892,36:PLOT21,1236,36
 1490 PLOT21,1236,200:GCOL0,1
 1500 FOR I%=924 TO 1208 STEP71:MOVEI%,4
0:DRAWI%,200:NEXT
 1510 FOR I%=60 TO 200 STEP56:MOVE892,I%
:DRAW1232,I%:NEXT
 1520 GCOL0,3:MOVE924,60:DRAW924,160
 1530 PRINTTAB(30,31);yb$;" Sonar ";bb$;
 1540 IF pg%>8 PRINTTAB(30,29);yb$;"Scop
e Off";bb$;
 1550 VDU29,640;512;24,-568;-456;564;452
;5
 1560 PROCship(X%,Y%)
 1570 PROCsonar(X%,Y%,TRUE)
 1580 ENDPROC
```

Continued ▶

◀ Run silent, run deep listing 2 continued

```
1590 :
1600 DEF PROCinit
1610 D%=RND(-TIME):ch%=0:speed%=12
1620 a=1:f=1/16
1630 FORI%=0TO7:PROCss(I%,500):PROCsn(I
%,"Acorn User"):NEXT
1640 yb$=CHR$17+CHR$130+CHR$17+CHR$1
1650 bb$=CHR$17+CHR$129+CHR$17+CHR$2
1660 ENDPROC
1670 :
1680 DEF PROCreset
1690 IF S%<>0 PRINT''"Score for patrol
";pg%;" = ";FNscore(T%)'"Total score = "
;S%
1700 D%=D%+10*(D%>20):d2%=D%DIV2:pg%=pg
%+1:t%=400*D%
1710 PRINT''SPC5;"Patrol ";pg%
1720 PRINT'"You have ";4*D%;" seconds t
o"'"locate the next sub..."'';yb$;
1730 PRINT" Press <space> to start  ";
1740 REPEAT UNTIL GET=32
1750 sx=RND(1000)-500:sy=RND(860)-430
1760 sd%=20+RND(200-D%):q%=0:L%=200
1770 X%=RND(200)-100:Y%=RND(200)-100
1780 K%=FALSE:O%=0:E%=-1:N%=20:C%=0
1790 P%=FALSE:V%=0:A%=0:bd%=40:B%=FALSE
1800 Z%=FALSE:torp%=FALSE:mb%=8:G%=0
1810 mx%=(RND(15)-8)*71:my%=(RND(15)-8)
*56
1820 mfs%=120-D%:PROCnsv
1830 IF pg%>3 cx%=RND(pg%DIV2+1)-(pg%DI
V4+1):cy%=RND(pg%DIV2)-(pg%DIV4+1) ELSE
cx%=0:cy%=0
1840 FOR I%=0 TO 252 STEP4:I%!&900=0:NE
XT
1850 m$="      ENEMY SUB IN AREA":M%=6
1860 xv=0:yv=0:RESTORE:TIME=0
1870 ENDPROC
1880 :
1890 DEF PROCcross(X%,Y%)
1900 MOVE X%-32,Y%:PLOT 21,X%+32,Y%
1910 MOVE X%,Y%-32:PLOT 21,X%,Y%+32
1920 ENDPROC
1930 :
1940 DEF PROCbouy(X%,Y%)
1950 mb%=mb%+(mb%>0)
1960 M%=1:m$=STR$(mb%)+" marker bouys l
eft      "
1970 IF mb%=0 SOUND2,1,200,4:ENDPROC
1980 SOUND 0,3,4,26:PROCship(X%,Y%)
1990 MOVE X%-16,Y%+16:VDU231
2000 PROCship(X%,Y%):ENDPROC
2010 :
2020 DEF PROCvert(S$,P%,V%)
2030 FOR I%=1 TO LEN(S$):PRINTTAB(P%,V%
+I%);MID$(S$,I%,1):NEXT
2040 ENDPROC
2050 :
2060 DEF PROChitable
2070 CLS:PRINTyb$;SPC3"Today's High Sco
res";SPC4;bb$
2080 FOR n%=0 TO 7
2090 PRINT;n%+1;SPC2;FNn(n%);STRING$(10
-LEN(STR$(FNs(n%))),".");FNs(n%)
2100 NEXT
2110 PROCspace:ENDPROC
2120 :
2130 DEF PROChiscore(S%)
2140 LOCAL n%:*FX21,0
2150 IF S%<=FNs(7) PRINT"You scored ";S
%':PROCspace:ENDPROC
2160 PRINT"Your score of ";S%;" will"'"
be recorded."
2170 INPUT"Please enter your"'"name: "m
$
2180 n%=8:REPEAT:n%=n%-1
2190 IF S%>FNs(n%) PROCss(n%+1,FNs(n%))
:PROCsn(n%+1,FNn(n%))
2200 UNTIL n%=0 OR S%<=FNs(n%)
2210 IF S%<=FNs(n%) n%=n%+1
2220 PROCss(n%,S%):PROCsn(n%,m$)
2230 ENDPROC
2240 :
2250 DEF FNs(n%)=!(&A00+4*n%)
2260 DEF FNn(n%)=$(&A28+11*n%)
2270 DEF PROCss(n%,S%):!(&A00+4*n%)=S%:
ENDPROC
2280 DEF PROCsn(n%,S$)
2290 IF LEN(S$)>=10 S$=LEFT$(S$,10) ELS
```

Continued ▶

◀ Continued

```
E S$=S$+STRING$(10-LEN(S$),".")
2300 $(&A28+11*n%)=S$:ENDPROC
2310 :
2320 DEF PROCspace
2330 PRINT'yb$;" Press SPACE to continu
e ";bb$;
2340 REPEAT UNTIL GET=32
2350 ENDPROC
2360 :
2370 DEF FNscore(T%)=(N%*(pg%DIV4+2)-A%
-(t%-T%)DIV100*(sd%DIV100+1)*(E%=0ANDK%=
0))*10*(pg%DIV4+1)
2380 :
2390 DEF FNinmf(X%,Y%)=ABS(X%-mx%)<mfs%
ANDABS(Y%-my%)<mfs%
2400 :
2410 DEF FNsv=RND(3)-2
2420 :
2430 DEF PROCds
2440 bx%=X%:by%=Y%:K%=TRUE:O%=6:E%=11
2450 torp%=FALSE:VDU19,0,1;0;:SOUND&10,
4,6,25
2460 ENDPROC
2470 :
2480 DEF PROCdcd(n%)
2490 bd%=bd%+n%:IF bd%<10 OR bd%>250 bd
%=bd%-n%
2500 VDU4:PRINTTAB(31,0);bb$;bd%;" ":VD
U5:ENDPROC
2510 :
2520 DEF PROCinmf
2530 H%=H%+RND(7)*4+8:G%=24
2540 IF RND(10+pg%*2)=1 A%=A%+1:SOUND&1
3,3,180,4:M%=1:m$=yb$+"  MINEFIELD WARNI
NG! "+STR$(d2%DIV2-A%+1)+"  "+bb$
2550 IF NOT K% AND A%>d2%DIV2 PROCds
2560 xv=xv-SGN(xv)*f*2:yv=yv-SGN(yv)*f*
2
2570 ENDPROC
2580 :
2590 DEF PROCdrop
2600 B%=TRUE:bx%=X%:by%=Y%:W%=bd%:dcdt%
=0
2610 COLOUR3:VDU4:PRINTTAB(35,0);"AWAY"
;:VDU5
2620 SOUND 2,1,1,6:ENDPROC
2630 :
2640 DEF FNcch=CHR$(240+3*SGN(cx%)+SGN(
cy%))
2650 :
2660 DEF PROClt
2670 SOUND 0,2,4,20:tx%=sx:ty%=sy
2680 txv%=6*sxv:tyv%=6*syv:torp%=-2
2690 PROCnsv:ENDPROC
2700 :
2710 DATA97,24,97,8,101,8,101,8,999,8
2720 DATA97,8,101,12,97,4,89,8,81,8,77,
16
```

Check-out our Checksums

IF you're having problems checking your listings, then send an A4 sized stamped addressed envelope plus a cheque or postal order for 50p, and we'll send you a photocopy of a line-by-line checksum value for each program in this month's *Acorn User.* These values can then be matched against your own using Tessie Revivis' BSUM program presented in the August 1985 *Acorn User*, so that you can spot instantly where the erroneous line is.

Cheques and postal orders should be made payable to Redwood Publishing and your envelope should be clearly marked Checksums and sent to Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

To use this checksum listing for Run silent, run deep program 2, you'll need BSUM program on page 47, August 1985.

Line Number	Checksum	Line Number	Checksum
60	1132	680	1126
70	687	690	1191
80	250	700	1366
90	1317	710	2632
100	250	720	2739
110	799	730	2123
120	1238	740	3751
130	63	750	3192
140	250	760	3841
150	2202	770	2236
160	1812	780	1278
170	1807	790	230
180	1854	800	63
190	1808	810	835
200	1873	820	4645
210	1246	830	4508
220	1246	840	2399
230	1070	850	2759
240	2542	860	2303
250	1953	870	2067
260	1755	880	1662
270	1913	890	1838
280	1805	900	4805
290	3410	910	2657
300	1784	920	2656
310	4407	930	853
320	1434	940	1637
330	1381	950	1935
340	580	960	63
350	1747	970	1212
360	1855	980	2223
370	2012	990	792
380	3519	1000	2599
390	63	1010	1456
400	2117	1020	242
410	2809	1030	230
420	1406	1040	63
430	7002	1050	1330
440	5454	1060	1979
450	6121	1070	1992
460	1046	1080	793
470	2246	1090	3110
480	455	1100	3435
490	63	1110	242
500	1837	1120	230
510	229	1130	63
520	63	1140	848
530	1604	1150	3510
540	1067	1160	230
550	6358	1170	63
560	3099	1180	959
570	5445	1190	2349
580	2581	1200	2793
590	903	1210	2172
600	1961	1220	2965
610	1705	1230	3536
620	1453	1240	2793
630	1933	1250	230
640	1460	1260	63
650	63	1270	3142
660	3685	1280	63
670	63		

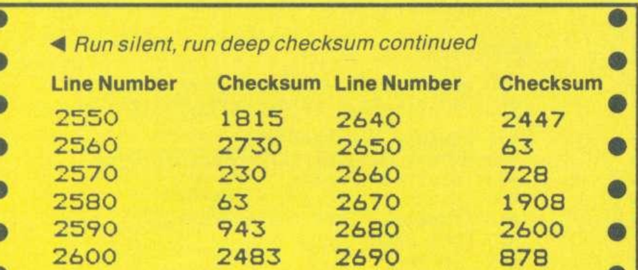
Continued ▶

◀ Continued

Line Number	Checksum	Line Number	Checksum
1290	1704	1920	230
1300	1702	1930	63
1310	1625	1940	1336
1320	230	1950	1046
1330	63	1960	3050
1340	1148	1970	1596
1350	1635	1980	1770
1360	1489	1990	1326
1370	2368	2000	1355
1380	4168	2010	63
1390	4159	2020	1493
1400	4761	2030	3007
1410	2979	2040	230
1420	4114	2050	63
1430	1479	2060	1238
1440	3419	2070	3406
1450	1880	2080	832
1460	1483	2090	3590
1470	1377	2100	242
1480	1800	2110	1061
1490	1227	2120	63
1500	2776	2130	1463
1510	2782	2140	878
1520	1632	2150	3649
1530	2064	2160	3638
1540	2988	2170	2765
1550	2013	2180	1092
1560	1070	2190	3767
1570	1413	2200	1508
1580	230	2210	1514
1590	63	2220	1831
1600	942	2230	230
1610	1835	2240	63
1620	641	2250	1443
1630	3714	2260	1498
1640	1629	2270	2270
1650	1615	2280	1127
1660	230	2290	3057
1670	63	2300	1141
1680	1054	2310	63
1690	5663	2320	1031
1700	2720	2330	3199
1710	1628	2340	901
1720	5106	2350	230
1730	2549	2360	63
1740	901	2370	5229
1750	1944	2380	63
1760	1737	2390	3634
1770	1654	2400	63
1780	1571	2410	1133
1790	1769	2420	63
1800	1844	2430	719
1810	2133	2440	2003
1820	1384	2450	2248
1830	5194	2460	230
1840	1926	2470	63
1850	1901	2480	1036
1860	1453	2490	2877
1870	230	2500	2369
1880	63	2510	63
1890	1444	2520	932
1900	1649	2530	1183
1910	1649	2540	6035

Continued ▶

See 'Quick on the Draw', page 80



◀ *Run silent, run deep checksum continued*

Line Number	Checksum	Line Number	Checksum
2550	1815	2640	2447
2560	2730	2650	63
2570	230	2660	728
2580	63	2670	1908
2590	943	2680	2600
2600	2483	2690	878
2610	2195	2700	63
2620	876	2710	1662
2630	63	2720	1861

How to enter Runplot

THIS listing has been packed to make it as small as possible – the longer this procedure is the less room will be available to you for your own program. The £ sign in front of all the variables and procedure names (except M%) avoids any variables clashing with those in your own programs.

To make this program easier to type in correctly, it has been split up in the same way as the PLOT2 program was in the August issue. The length of each part is given below. When all the various parts have been saved and combined again in the method described last month, the whole procedure should be *SPOOLED using the filename RUNPLOT.

Line number	Length
20000-20050	500
20060-20100	508
20110-20150	265
20160-20200	269
20210-20250	398
20260-20310	452

Listing 1. Martin Phillips' Runplot allows pictures drawn with Easyplot to be displayed in your own programs

```
20000 DEFPROC£LOAD(£T$)
20010 PROC£dim:£=OPENIN(£T$):INPUT#£,£A%
:FOR£N=0 TO£A%:£A?£N=BGET#£:NEXT:CLOSE#£
:VDU23;8202;0;0;0;:£N%=2^(1+M%MOD3):£n%=
£N%-1:IFM%>3£n%=(£N%/2)-1
20020 MOVE0,96:DRAW1279,96:DRAW1279,1023
:DRAW0,1023:DRAW0,96
20030 FOR£N=0 TO£n%:VDU19,£N,(£A?£N);0;:
NEXT:VDU28,0,31,(160/£N%)-1,29:£N=8:REPE
AT:PROC£r(£N):£N1=FN£a:PROC£ty(£N,0,0):£
N=£N+£N1:UNTIL£N>=£A%:ENDPROC
20040 DEFPROC£dim:£J%=HIMEM-(TOP+1500):V
DU21:DIM£A (£J%-24),£F 75,£f(1,1),£Q%(75
),P% 30:£f%=P%+20:[:OPT0:.£f6%:LDX#£f%MO
D256:LDY#£f%DIV256:LDA#&D:JSR&FFF1:RTS:]
:VDU6:ENDPROC
20050 DEFPROC£mo(x,y,s,e):LOCALs1:REPEAT
:PROC£r(s):s1=FN£a:PROC£ty(s,x,y):s=s+s1
:UNTILs>e-1:ENDPROC


20060 DEFPROC£ci(K):£cs=2*PI/£P%:£cr=SQR
((£Y%-£y%)^2+(£X%-£x%)^2):IF£cr<2*£N%THE
NENDPROC:ELSE£ca=ATN((£X%-£x%)/(0.5+£Y%-
£y%)):IF£Y%<£y%THEN£ca=£ca+PI:ELSEIF£X%<
£x%THEN£ca=£ca+2*PI
20070 MOVE£X%,£Y%:FOR£cn=1 TO£P%:PLOTK,£
x%+£cr*SIN(£ca+£cn*£cs),£y%+£cr*COS(£ca+
£cn*£cs):NEXT:ENDPROC
20080DEFPROC£pr(pc,d):VDU5,18,pc,£C%,25,
4,£x%;£y%+32*d;:IFd=1:PRINT£P$:VDU4:ENDP
ROC
20090 A%=10:X%=0:Y%=10:£p=&A00:FOR£pb%=1
TOLEN£P$:£p$=MID$(£P$,£pb%,1):IF£p$<"
":VDU10,8,10£pb%=£pb%+1:GOTO20110
20100 ?£p=ASC£p$:CALL&FFF1:VDU23,240,£p?
```

Continued ▶

◀ *Runplot continued*

```
1,£p?1,£p?2,£p?2,£p?3,£p?3,£p?4,£p?4:VDU
23,241,£p?5,£p?5,£p?6,£p?6,£p?7,£p?7,£p?
8,£p?8,240,8,10,241,11;


20110 NEXT:VDU4:ENDPROC
20120DEFPROC£ty(a%,ax,ay):GCOL0,£C%:IF£B
%=15 PROC£mo(ax+£A!(a%+8),ay+£A!(a%+12),
£x%,£X%):ENDPROC
20130 £x%=£x%+ax:£y%=£y%+ay:IF£B%<4£X%=£
X%+ax:£Y%=£Y%+ay
20140 IF£B%=1:MOVE£x%,£y%:PLOT(£D%+5),£X
%,£Y%
20150 IF£B%=2:MOVE£x%,£y%:PLOT(£D%+5),£X
%,£y%:PLOT(£D%+5),£X%,£Y%:PLOT(£D%+5),£x
%,£Y%:PLOT(£D%+5),£x%,£y%


20160 IF£B%=3:£P%=£D%MOD160:£D%=16*(£D%D
IV160):PROC£ci(£D%+5)
20170 IF£B%=4:£f(0,0)=£A?(a%+4):£f(1,0)=
£A?(a%+5):£f(0,1)=£A?(a%+6):£f(1,1)=£A?(
a%+7):PROC£fi
20180 IF£B%=16:£P$=$(£A+a%+8):PROC£pr(0,
£X%)
20190 IF£B%=17:MOVE£x%,£y%:FOR£i=a%+8
TO£D%+7+a%STEP3:DRAWax+256*(£A?£i)+£A?(£
i+1),ay+4*(£A?(£i+2)):NEXT


20200 ENDPROC
20210 DEFFN£a=8+£D%*(£B%DIV10)
20220 DEFPROC£r(a%):£B%=(£A?a%)DIV8:£C%=
(£A?a%)MOD8:£x%=256*(£A?(a%+1))+£A?(a%+2
):£y%=4*(£A?(a%+3)):£X%=256*(£A?(a%+4))+
£A?(a%+5):£Y%=4*(£A?(a%+6)):£D%=£A?(a%+7
):ENDPROC
20230 DEFPROC£fi:£f1%=1:£f2%=0:PROC£fa(£
x%):REPEAT:£f3%=£Q%(£f1%):£f4%=£Q%(£f1%+
25):£y%=4+£Q%(£f1%+50):£f1%=(£f1%+1)MOD2
5:PROC£fc:£y%=£y%-8:PROC£fc:UNTIL£f1%=£f
2%+1:ENDPROC
20240 DEFPROC£fc:£Z%=POINT(£f3%,£y%):IF£
Z%=-1ENDPROC:ELSEIF£Z%=0£f8%=£f3%:ELSEPR
OC£fb(£f3%)
20250 IF£f8%>£f4%-£N%:ENDPROC


20260 REPEAT:PROC£fa(£f8%):PROC£fb(£f8%)
:UNTIL£f8%>£f4%-£N%:ENDPROC
20270 DEFPROC£fa(x%):PLOT76,x%,£y%:CALL£
f6%:£f2%=(£f2%+1)MOD25:£Q%(£f2%)=!£f%AND
&FFFF:£Q%(£f2%+25)=£f%!4 AND&FFFF:PROC£f
d(£Q%(£f2%),£Q%(£f2%+25)):£Q%(£f2%+50)=£
y%:ENDPROC
20280 DEFPROC£fb(£f10%):PLOT92,£f10%,£y%
:CALL£f6%:£f8%=£N%+£f%!4 AND&FFFF:IF£f8%
>£f4%PROC£fd(£f10%,£f4%)ELSEPROC£fd(£f10
%,£f8%-£N%)
20290 ENDPROC
20300 DEFPROC£fd(£f10%,£f11%):£Y%=(£y%DI
V4)MOD2:£X%=(£f10%DIV£N%)MOD2:GCOL0,£f(£
X%,£Y%):IFPOINT(£f11%,£y%)=0:PLOT77,£f11
%,£y%:GCOL0,£f((£X%+1)MOD2,£Y%):MOVE£f10
%+£N%,£y%:PLOT21,£f11%,£y%
20310 ENDPROC
```

Listing cassettes and bar code booklets

IF KEYING in all these listings gets you down and your fingers in a tangle why not send off for our monthly listings cassette? It contains all the major programs in this issue and costs £3.75 including postage and packing. You'll find the details about the cassette and the order form on page 96.

Better still, be the envy of your friends and buy a barcode reader (see our offer on page 113). All the listings in these yellow pages are reproduced in bar code format – send a cheque or postal order for £1.60 plus an A4-sized stamped addressed envelope to Bar Code Listings, Acorn User, 68 Long Acre, London WC2E 9JH.

See 'Relocation Scheme', page 117

Entering Disloc

ALTHOUGH the program is designed to run with a 6502 second processor attached, it may be entered without it. Make sure that page is set no higher than &1900 and leave out all REMs and excess spaces or else you may run out of memory when you run it. The Basic should be straightforward to type in and the assembly language routine is quite short, so, if you are careful, no errors should occur.

So that the data at the end of the listing is entered correctly, a checksum routine has been included. If you have made a typing error a message will be displayed. Check your listing, and when no message appears delete the checksum (lines 90 to 120) and save the program.

Disloc procedures

HERE is a summary of the more important procedures. Before the program can go to work on the ROMs it has to set up several tables. This is done by PROCsetupdiss at line 1950. The table mn% contains the assembler commands, and the command types (eg, "immediate", "zero-page,X") are stored in the table type%. PROCsetup_rom (line 340) assembles the short machine-code routine that is used by FNrdrom (line 760) to read a byte from the chosen ROM. PROCdiss (line 860) handles the disassembling, calling FNline (line 1000) which uses the tables set up by PROCsetupdiss to disassemble an individual instruction. PROCreloc (line 1200) enables the user to relocate blocks, jump tables and individual bytes. Finished code is saved by PROCsave at line 1540.

Listing 1. Disloc will relocate languages to allow fuller use of the second processor's memory

```
   10 REM Disloc
   20 REM by Peter Higginbotham
   30 REM for BBC B/B+ with 2nd 6502
   40 REM (c) Acorn User Sept. 1985
   50 :
   60 MODE7:HIMEM=&3C00
   70 PROCtitle
   80 PROCsetupdiss
   90 REM Checksum for data
  100 T%=0:FORX%=0TO255:T%=T%+X%?type%:N
EXT
  110 FORX%=0TO1023:T%=T%+X%?mn%:NEXT
  120 IFT%<>48467 CLS:PRINT"Checksum err
or - please check data":END
  130 PROCgetcode
  140 :
  150 ONERROR IFERR<>17 REPORT:PRINT" at
 ";ERL:STOP
  160 REPEAT:PROCtitle
  170 PRINT" 1=Disassemble"''" 2=Relocat
e"''" 3=*SAVE code"''" 4=Quit"'
  180 job%=FNq("Which do you want",1,4,0
)
  190 IFjob%=1 PROCdiss
  200 IFjob%=2 PROCreloc
  210 IFjob%=3 PROCsave
  220 UNTILjob%=4
  230 END
  240 :
  250 DEFPROCgetcode
  260 romst%=&8000:up%=romst%-HIMEM
  270 job1%=FNq("Source code from 1=ROM,
 2=File",1,2,0)
  280 IFjob1%=1 PROCsetup_rom:PROCcopyro
m:ELSE PROCloadfile
  290 spage%=romst%DIV256:epage%=romend%
DIV256
  300 size%=(epage%-spage%+1)*256:newst%
=&F800-size%
  310 move%=newst%-romst%:mpage%=move%DI
V256
  320 ENDPROC
  330 :
  340 DEFPROCsetup_rom
```

Continued ▶

◀ Continued

```
  350 osbyte%=&FFF4:osword%=&FFF1
  360 DIM blk1%4,blk2%4,blk3%4,S%1,rbyte
%50
  370 A%=&FC:X%=0:Y%=&FF
  380 S%?1=(USR(osbyte%)AND&FF00)DIV256
  390 !blk1%=&FFFF00F4
  400 !blk3%=!blk1%:blk3%?4=S%?1
  410 FORpass%=0TO2STEP2:P%=rbyte%
  420 [OPT pass%
  430 LDA #6
  440 LDX #blk1%MOD256
  450 LDY #blk1%DIV256
  460 JSR osword%
  470 LDA #&97
  480 LDA #&30
  490 LDY S%
  500 \ Enable ROM
  510 JSR osbyte%
  520 LDA #5
  530 LDX #blk2%MOD256
  540 LDY #blk2%DIV256
  550 \ Read byte
  560 JSR osword%
  570 LDA #6
  580 LDX #blk3%MOD256
  590 LDY #blk3%DIV256
  600 JSR osword%
  610 LDA #&97
  620 LDA #&30
  630 LDY S%+1
  640 JSR osbyte% \Re-enable BASIC
  650 RTS
  660 ]
  670 NEXTpass%:ENDPROC
  680 :
  690 DEFPROCcopyrom
  700 skt%=FNq("Which ROM socket",0,15,0
)
  710 romend%=FNq("End address of code",
&80FF,&BFFF,1)
  720 PRINT'"Please wait..."
  730 FORa%=romst%TOromend%:?(a%-up%)=FN
rdrom(skt%,a%):NEXT
  740 ENDPROC
  750 :
  760 DEFFNrdrom(r%,a%):blk1%?4=r%:!blk2
%=a%:CALLrbyte%:=blk2%?4
  770 :
  780 DEFPROCloadfile
  790 INPUT'"Name of file:"$file%
  800 !j%=file%:!(j%+2)=HIMEM
  810 A%=&FF:X%=j%MOD256:Y%=j%DIV256
  820 I%=USR(&FFDD)
  830 romend%=romst%+!(j%+&A)-1
  840 ENDPROC
  850 :
  860 DEFPROCdiss:PROCtitle
  870 REPEAT:PROCrange
  880 INPUT'"Search string (RETURN if no
ne):"search$
  890 VDU14
  900 FORrom%=st%TOend%:ram%=rom%-up%
  910 line$=FNline(ram%,rom%):IFsearch$=
""ORINSTR(line$,search$)PRINTline$
  920 rom%=rom%+len%
  930 NEXTrom%
  940 VDU15
  950 UNTILFNY("More")=FALSE
  960 ENDPROC
  970 :
  980 REM Disassemble a%, put operand
  990 REM length in len%
 1000 DEFFNline(a%,b%):d$=""
 1010 in%=?a%:m%=type%?in%
 1020 len%=odlen%?m%:od%=0
 1030 IFlen%>0 FORI%=len%TO1STEP-1:od%=o
d%*256+a%?I%:NEXT
 1040 FORI%=0TOlen%:d$=d$+" "+RIGHT$("0"
+STR$~(a%?I%),2):NEXT
 1050 d$=d$+STRING$(3*(3-len%)," ")+$(mn
%+in%*4)+" "
 1060 od$=RIGHT$("0000"+STR$~od%,len%*2)
 1070 IFin%=jsr%ANDod%>=&FFCE od$=FNosna
me(od$)
 1080 IFm%=3 od$="#"+od$
 1090 IFm%=4 od%=rom%+FNrel(od%+2):od$=R
IGHT$("0000"+STR$~od%,4)
 1100 IFm%=6ORm%=11 od$=od$+",X"
 1110 IFm%=7ORm%=12 od$=od$+",Y"
```

Continued ▶

◀ *Disloc listing continued*

```
 1120 IFm%=8ORm%=13 od$="("+od$+")"
 1130 IFm%=9 od$="("+od$+"),Y"
 1140 d$=d$+od$+STRING$(10-LEN(od$)," ")
 1150 FORI%=0TOlen%:J%=(ram%?I%)MOD128
 1160 IFJ%<32ORJ%>126 J%=32
 1170 d$=d$+CHR$(J%):NEXT
 1180 =RIGHT$("0000"+STR$~b%,4)+d$
 1190 :
 1200 DEFPROCreloc:PROCtitle
 1210 REPEAT
 1220 PRINT'" 1=Relocate Block"'" 2=Jum
p Table"'" 3=Single Byte"
 1230 job1%=FNq("Which do you want",1,3,
0)
 1240 IFjob1%<3 PROCrange ELSEst%=FNq("A
ddress",romst%,romend%,1):end%=st%
 1250 IFjob1%=1 PRINT'"Address of string
 output routine";:pr%=FNq("0 if don't kn
ow",0,&FFFF,1)
 1260 IFjob1%=1 ds%=FNY("Include double-
stores"):dp%=FNY("Include double-pushes"
)
 1270 do%=FNq("1=Preview targets, 2=Do r
eloc",1,2,0)
 1280 IFjob1%=1 PROCblock ELSEPROCtable
 1290 UNTILFNY("More")=FALSE
 1300 ENDPROC
 1310 :
 1320 DEFPROCblock:last%=0
 1330 IFdo%=2 PRINT'"Please wait..."
 1340 FORrom%=st%TOend%:ram%=rom%-up%
 1350 IFdo%=1 line$=FNline(ram%,rom%)
 1360 in%=?ram%:m%=type%?in%
 1370 len%=odlen%?m%:od%=0
 1380 IFlen%>0 FORI%=len%TO1STEP-1:od%=o
d%*256+ram%?I%:NEXT
 1390 ram%=ram%+len%:rom%=rom%+len%
 1400 IFlen%=2 ?ram%=FNmove(?ram%)
 1410 IFpr%>0 ANDin%=jsr% ANDod%=pr%:REP
EAT:ram%=ram%+1:rom%=rom%+1:UNTIL?ram%=0
OR?ram%=&FF
 1420 IFds%=TRUE ANDod%=last%+1 AND(in%=
sta%ORin%=stz%) a%=ram%-len%-1:IF?(a%-1)
=lda% ?a%=FNmove(?a%)
 1430 IFdp%=TRUE ANDin%=lda% AND?(ram%+1
)=psh% AND?(ram%+4)=psh% ?ram%=FNmove(?r
am%)
 1440 IFm%>=5 last%=od%
 1450 NEXTrom%
 1460 ENDPROC
 1470 :
 1480 DEFPROCtable
 1490 FORrom%=st%TOend%STEP2
 1500 ram%=rom%-up%:IFdo%=1 line$=FNline
(ram%,rom%)
 1510 ?ram%=FNmove(?ram%)
 1520 NEXTrom%:ENDPROC
 1530 :
 1540 DEFPROCsave:INPUT'"Filename:"N$
 1550 PROCoscli("*SAVE "+N$+" "+STR$~HIM
EM+" +"+STR$~size%+" "+STR$~newst%+" "+S
TR$~newst%)
 1560 ENDPROC
 1570 :
 1580 DEFPROCoscli(A$)
 1590 $j%=A$:X%=j%MOD256:Y%=j%DIV256
 1600 CALL&FFF7:ENDPROC
 1610 :
 1620 DEFPROCtitle:CLS
 1630 FORI%=1TO2:PRINTTAB(3)CHR$(141)"RO
M Disassembler/Relocator"
 1640 NEXT:PRINT:ENDPROC
 1650 :
 1660 DEFFNq(Q$,lo%,hi%,hx%):PRINT
 1670 REPEAT
 1680 IFhx%=0 PRINTQ$" ("STR$lo%"-"STR$h
i%")";:INPUT":"A$:A=VAL(A$)
 1690 IFhx%=1 PRINTQ$" (Hex "STR$~lo%"-"
STR$~hi%")";:INPUT":"A$:A=EVAL("&0"+A$)
 1700 UNTILA>=lo%ANDA<=hi%:=A
 1710 :
 1720 DEFFNY(Q$):PRINT
 1730 REPEAT
 1740 PRINTQ$;" (Y/N)";:INPUT":"A$
 1750 UNTILA$>""ANDINSTR("YyNn",A$)>0
 1760 =(INSTR("Yy",A$)>0)
 1770 :
 1780 DEFPROCrange
```

Continued ▶

◀ *Continued*

```
 1790 st%=FNq("Start Address",romst%,rom
end%,1)
 1800 end%=FNq("End Address",st%,romend%
,1)
 1810 ENDPROC
 1820 :
 1830 DEFFNmove(a%):IFa%<spage%ORa%>epag
e% =a%
 1840 IFdo%=1 PRINTline$:=a%
 1850 =a%+mpage%
 1860 :
 1870 DEFFNosname(N$):RESTORE2850
 1880 REPEAT:READA$,B$
 1890 UNTILA$=N$ORA$="*"
 1900 IFA$="*" =N$ ELSE=B$
 1910 :
 1920 DEFFNrel(a%)
 1930 IFa%<128=a% ELSE=a%-256
 1940 :
 1950 DEFPROCsetupdiss
 1960 lda%=&A9:jsr%=&20:psh%=&48:sta%=&8
D:stz%=&85
 1970 DIM od%2,odlen%13,type%255,mn%1023
,file%10,j%40
 1980 line$=STRING$(40," "):d$=line$
 1990 FORI%=0TO255:type%?I%=0:$(mn%+I%*4
)="    ":NEXT
 2000 FORI%=0TO13:READodlen%?I%:NEXT
 2010 FORI%=1TO13
 2020 REPEAT:READin$,mn$
 2030 IFin$<>"*" J%=EVAL("&"+in$):type%?
J%=I%:$(mn%+J%*4)=mn$
 2040 UNTILin$="*"
 2050 NEXT
 2060 ENDPROC
 2070 :
 2080 REM Operand lengths
 2090 DATA 0,0,0,1,1,1,1,1,1,1,2,2,2,2
 2100 :
 2110 REM Implied
 2120 DATA 00,BRK,18,CLC,D8,CLD,58,CLI
 2130 DATA B8,CLV,CA,DEX,88,DEY,E8,INX
 2140 DATA C8,INY,EA,NOP,48,PHA,08,PHP
 2150 DATA 68,PLA,28,PLP,40,RTI,60,RTS
 2160 DATA 38,SEC,F8,SED,78,SEI,AA,TAX
 2170 DATA A8,TAY,BA,TSX,8A,TXA,9A,TXS
 2180 DATA 98,TYA,*,*
 2190 :
 2200 REM Accumulator
 2210 DATA 0A,ASL,4A,LSR,2A,ROL,6A,ROR
 2220 DATA *,*
 2230 :
 2240 REM Immediate
 2250 DATA 69,ADC,29,AND,C9,CMP,E0,CPX
 2260 DATA C0,CPY,49,EOR,A9,LDA,A2,LDX
 2270 DATA A0,LDY,09,ORA,E9,SBC,*,*
 2280 :
 2290 REM Relative
 2300 DATA 90,BCC,B0,BCS,F0,BEQ,30,BMI
 2310 DATA D0,BNE,10,BPL,50,BVC,70,BVS
 2320 DATA *,*
 2330 :
 2340 REM Zero Page
 2350 DATA 65,ADC,25,AND,06,ASL,24,BIT
 2360 DATA C5,CMP,E4,CPX,C4,CPY,C6,DEC
 2370 DATA 45,EOR,E6,INC,A5,LDA,A6,LDX
 2380 DATA A4,LDY,46,LSR,05,ORA,26,ROL
 2390 DATA 66,ROR,E5,SBC,85,STA,86,STX
 2400 DATA 84,STY,*,*
 2410 :
 2420 REM Z-Page,X
 2430 DATA 75,ADC,35,AND,16,ASL,D5,CMP
 2440 DATA D6,DEC,55,EOR,F6,INC,B5,LDA
 2450 DATA B4,LDY,56,LSR,15,ORA,36,ROL
 2460 DATA 76,ROR,F5,SBC,95,STA,94,STY
 2470 DATA *,*
 2480 :
 2490 REM Z-Page,Y
 2500 DATA B6,LDX,96,STX,*,*
 2510 :
 2520 REM (Indirect,X)
 2530 DATA 61,ADC,21,AND,C1,CMP,41,EOR
 2540 DATA A1,LDA,01,ORA,E1,SBC,81,STA
 2550 DATA *,*
 2560 :
 2570 REM (Indirect),Y
 2580 DATA 71,ADC,31,AND,D1,CMP,51,EOR
 2590 DATA B1,LDA,11,ORA,F1,SBC,91,STA
```

Continued ▶

◄ Disloc listing continued

```
2600 DATA *,*
2610 :
2620 REM Absolute
2630 DATA 6D,ADC,2D,AND,0E,ASL,2C,BIT
2640 DATA CD,CMP,EC,CPX,CC,CPY,CE,DEC
2650 DATA 4D,EOR,EE,INC,4C,JMP,20,JSR
2660 DATA AD,LDA,AE,LDX,AC,LDY,4E,LSR
2670 DATA 0D,ORA,2E,ROL,6E,ROR,ED,SBC
2680 DATA 8D,STA,8E,STX,8C,STY,*,*
2690 :
2700 REM Abs,X
2710 DATA 7D,ADC,3D,AND,1E,ASL,DD,CMP
2720 DATA DE,DEC,5D,EOR,FE,INC,BD,LDA
2730 DATA BC,LDY,5E,LSR,1D,ORA,3E,ROL
2740 DATA 7E,ROR,FD,SBC,9D,STA,*,*
2750 :
2760 REM Abs,Y
2770 DATA 79,ADC,39,AND,D9,CMP,59,EOR
2780 DATA B9,LDA,BE,LDX,19,ORA,F9,SBC
2790 DATA 99,STA,*,*
2800 :
2810 REM (Indirect)
2820 DATA 6C,JMP,*,*
2830 :
2840 REM OS routines
2850 DATA FFCE,OSFIND,FFD1,OSGBPB
2860 DATA FFD4,OSBPUT,FFD7,OSBGET
2870 DATA FFDA,OSARGS,FFDD,OSFILE
2880 DATA FFE0,OSRDCH,FFE3,OSASCI
2890 DATA FFE7,OSNEWL,FFEE,OSWRCH
2900 DATA FFF1,OSWORD,FFF4,OSBYTE
2910 DATA FFF7,OSCLI,*,*
```

Checksums for Disloc

TO check you've entered Peter Higginbotham's Disloc listing correctly here's a set of checksums for each line. To use the checksum listing you'll need Tessie Revivis' program on page 47 of the August issue.

The checksum figures for the Disloc program

Line Number	Checksum	Line Number	Checksum
10	894	310	3262
20	2331	320	230
30	2125	330	63
40	2202	340	1468
50	63	350	2214
60	886	360	2682
70	798	370	1075
80	1252	380	2059
90	1919	390	1049
100	2498	400	1824
110	2015	410	2081
120	4831	420	856
130	985	430	340
140	63	440	1004
150	2493	450	1003
160	1103	460	993
170	4579	470	438
180	2755	480	425
190	1419	490	395
200	1519	500	993
210	1417	510	985
220	729	520	339
230	229	530	1005
240	63	540	1004
250	1207	550	987
260	2109	560	993
270	3706	570	340
280	4430	580	1006
290	3192	590	1005
300	3626	600	993

Continued ►

◄ Disloc checksum continued

Line Number	Checksum	Line Number	Checksum
610	438	1310	63
620	425	1320	1645
630	489	1330	2208
640	2355	1340	2649
650	256	1350	2616
660	98	1360	1826
670	1008	1370	1632
680	63	1380	3675
690	1253	1390	2467
700	2680	1400	2345
710	3738	1410	6067
720	1579	1420	6919
730	4289	1430	5596
740	230	1440	1387
750	63	1450	617
760	4362	1460	230
770	63	1470	63
780	1309	1480	994
790	1991	1490	1665
800	1329	1500	3788
810	1720	1510	1607
820	767	1520	902
830	1914	1530	63
840	230	1540	2290
850	63	1550	5427
860	1761	1560	230
870	1082	1570	63
880	3698	1580	1198
890	347	1590	1720
900	2649	1600	812
910	5317	1610	63
920	1220	1620	1299
930	617	1630	4250
940	348	1640	828
950	1299	1650	63
960	230	1660	1915
970	63	1670	250
980	2805	1680	3422
990	1573	1690	4181
1000	1549	1700	1462
1010	1601	1710	63
1020	1632	1720	984
1030	3450	1730	250
1040	3099	1740	1412
1050	2374	1750	1565
1060	1936	1760	901
1070	3245	1770	63
1080	1243	1780	999
1090	3774	1790	3532
1100	1787	1800	3027
1110	1790	1810	230
1120	1854	1820	63
1130	1545	1830	3232
1140	1715	1840	1596
1150	2144	1850	811
1160	1289	1860	63
1170	1069	1870	1948
1180	1353	1880	805
1190	63	1890	950
1200	1860	1900	1064
1210	250	1910	63
1220	4445	1920	936
1230	2804	1930	1366
1240	5442	1940	63
1250	7073	1950	1474
1260	6511	1960	3173
1270	3636	1970	3378
1280	2499	1980	1744
1290	1299	1990	2855
1300	230	2000	2091

Continued ►

See 'On the Transfer List', page 137

◀ *Disloc checksum continued*

Line Number	Checksum	Line Number	Checksum
2010	743	2470	389
2020	1110	2480	63
2030	3499	2490	939
2040	687	2500	1297
2050	242	2510	63
2060	230	2520	1325
2070	63	2530	1877
2080	1799	2540	1910
2090	1544	2550	389
2100	63	2560	63
2110	997	2570	1326
2120	1887	2580	1881
2130	2003	2590	1914
2140	1988	2600	389
2150	1956	2610	63
2160	1968	2620	1121
2170	2073	2630	1925
2180	835	2640	2033
2190	63	2650	1986
2200	1445	2660	2028
2210	2002	2670	2010
2220	389	2680	1789
2230	63	2690	63
2240	1202	2700	697
2250	1922	2710	1948
2260	1961	2720	1985
2270	1693	2730	2022
2280	63	2740	1752
2290	1118	2750	63
2300	1877	2760	698
2310	1899	2770	1913
2320	389	2780	1967
2330	63	2790	830
2340	1120	2800	63
2350	1865	2810	1191
2360	1973	2820	836
2370	1947	2830	63
2380	1958	2840	1376
2390	1988	2850	1842
2400	848	2860	1865
2410	63	2870	1875
2420	938	2880	1831
2430	1888	2890	1897
2440	1925	2900	1882
2450	1962	2910	1131
2460	1991		

Listing 1. Enables Basic programs to be edited using *Wordwise*. For B+, alter checksum value in line 120 from 22512 to 22498. This is because the program accesses vectors in page &2, the contents of which differ between the B and B+

```
   10 REM Wordwise Edit
   20 REM by Neil Gordon
   30 REM for BBC B/B+ with Wordwise
   40 REM (c) Acorn User September 1985
   50 :
   60 PROCinit
   70 PROCassemble
   80 :
   90 REM Checksum
  100 T%=0
  110 FOR X%=&C00 TO P%-1:T%=T%+?X%:NEXT
  120 IFT%<>22512 CLS:PRINT"Checksum err
or - please check":END
  130 :
  140 PROCkeys
  150 END
  160 :
  170 DEF PROCinit
  180 topH=&13:pageH=&18
  190 wwpointerL=&78:wwpointerH=&79
  200 wrpointerL=&84:wrpointerH=&85
```

Continued ▶

◀ *Wordwise editor continued*

```
  210 rdpointerL=&86:rdpointerH=&87
  220 ysave=&88:blankflag=&89
  230 oswrchL=&20E:oswrchH=&20F
  240 osrdchL=&210:osrdchH=&211
  250 osbyte=&FFF4:oscli=&FFF7
  260 ENDPROC
  270 :
  280 DEF PROCassemble
  290 FOR PASS=0 TO 3 STEP 3
  300 P%=&C00
  310 [OPT PASS
  320 \ Basic to Wordwise
  330 .btwinit
  340 \ Intercept OSwrch
  350 LDA #wrch MOD 256
  360 STA oswrchL
  370 LDA #wrch DIV 256
  380 STA oswrchH
  390 LDA topH
  400 CLC
  410 ADC #1
  420 STA wrpointerH
  430 STA rdpointerH
  440 LDA pageH
  450 ADC #3
  460 CMP wrpointerH
  470 BMI oktop
  480 STA wrpointerH
  490 STA rdpointerH
  500 .oktop
  510 LDA #0
  520 STA wrpointerL
  530 RTS
  540 .restore
  550 LDA #?oswrchL
  560 STA oswrchL
  570 LDA #?oswrchH
  580 STA oswrchH
  590 RTS
  600 .btwcopy
  610 LDA wrpointerL
  620 SEC
  630 SBC #11
  640 STA wrpointerL
  650 BCS samepage
  660 DEC wrpointerH
  670 .samepage
  680 LDA #0
  690 STA rdpointerL
  700 LDY #3
  710 STA (rdpointerL),Y
  720 TAY            \ (zero)
  730 .loop
  740 LDA (wrpointerL),Y
  750 BEQ donemove
  760 LDX wwpointerL
  770 BNE okww
  780 DEC wwpointerH
  790 .okww
  800 DEC wwpointerL
  810 STA (wwpointerL),Y
  820 LDX wrpointerL
  830 BNE okwr
  840 DEC wrpointerH
  850 .okwr
  860 DEC wrpointerL
  870 JMP loop
  880 .donemove
  890 RTS
  900 .wrch
  910 CMP #&A
  920 BEQ end
  930 STY ysave
  940 LDY #0
  950 STA (wrpointerL),Y
  960 INC wrpointerL
  970 BNE skip
  980 INC wrpointerH
  990 .skip
 1000 LDY ysave
 1010 .end
 1020 RTS
 1030 \ Wordwise to Basic
 1040 .wtb
 1050 LDA wwpointerL
 1060 STA rdpointerL
```

Continued ▶

See 'Commenting on View', page 141

◄ *Wordwise editor continued*

```
1070 LDA wwpointerH
1080 STA rdpointerH
1090 LDA #0
1100 STA blankflag
1110 LDA #rdch MOD 256
1120 STA osrdchL
1130 LDA #rdch DIV 256
1140 STA osrdchH
1150 RTS
1160 .rdch
1170 STY ysave
1180 LDY #0
1190 LDA (rdpointerL),Y
1200 CMP #129
1210 BEQ finish
1220 CMP #&D
1230 BNE negreturn
1240 STY blankflag
1250 JMP newpointer
1260 .negreturn
1270 CMP #32
1280 BNE negblank
1290 LDA blankflag
1300 JMP newpointer
1310 .negblank
1320 CMP #ASC("0")
1330 BMI okblank
1340 CMP #(ASC("9")+1)
1350 BMI newpointer
1360 .okblank
1370 LDY #32
1380 STY blankflag
1390 .newpointer
1400 INC rdpointerL
1410 BNE exit
1420 INC rdpointerH
1430 JMP exit
1440 .finish
1450 LDA #?osrdchL
1460 STA osrdchL
1470 LDA #?osrdchH
1480 STA osrdchH
1490 TYA
1500 .exit
1510 LDY ysave
1520 CLC
1530 RTS
1540 ]
1550 NEXT PASS
1560 ENDPROC
1570 :
1580 DEF PROCkeys
1590 DIM A 250
1600 X%=A MOD 256
1610 Y%=A DIV 256
1620 B$=STRING$(200," ")
1630 B$="KEY0|UMO.7|ML.01|M"
1640 B$=B$+"CA."+STR$(btwinit)+"|ML.|M"
1650 B$=B$+"CA."+STR$(restore)+"|M"
1660 B$=B$+"*W.|MN*B.|M"
1670 B$=B$+"CA."+STR$(btwcopy)+"|M"
1680 B$=B$+"*W.|MY|["
1690 B$=B$+"|!|N|!#|!|O|!%|!#|!|N|!,|A|
!|O"
1700 $A=B$
1710 CALL oscli
1720 B$="KEY1|!|O"
1730 B$=B$+"|[*B.|M"
1740 B$=B$+"*FX225,1|M"
1750 B$=B$+"CA."+STR$(wtb)+"|M"
1760 $A=B$
1770 CALL oscli
1780 ENDPROC
```

Listing 1. David Andrews' ViewSuite program

```
10 REM ViewSuite
20 REM by David Andrews
30 REM BBC B/B+ DFS and View
40 REM (c) Acorn User September 1985
50 :
60 ON ERROR GOTO 1410
70 MODE 3
```

Continued ►

◄ *ViewSuite continued*

```
80 DIM buf% 50,buffer%&200,readcat&50
90 oscli%=&FFF7
100 :
110 *FX 18
120 *FX 12
130 :
140 REM if no dummy, move REM from
150 REM line 180 to line 170
160 :
170 PROCoscli("KEY9*DR.0|MLOAD dummy|M
*DR."+STR$(D%)+"|M*KEY9|M")
180 REM*KEY9NEW|M*KEY9|M
190 :
200 PROCintro
210 PROCmakecode
220 CALLreadcat
230 PROCdecode
240 :
250 REM display catalogue
260 :
270 PROCoscli("DR."+STR$(D%))
280 @%=2:T%=0:size%=0:safe=FALSE
290 PRINT
300 FOR Z%=0 TO E%-1
310 N%=OPENIN name$(Z%)
320 size%=size%+EXT#N%
330 IF name$(Z%)="$.S-A-F-E" THEN safe
=TRUE
340 F%=BGET#N%
350 IF F%=128 THEN PROCprint
360 CLOSE#N%
370 safe=FALSE
380 NEXT
390 PRINT STRING$(79,"_")'"Drive ";D%;
400 PRINTTAB(32)"Total files ";E% TAB(
63)"Space used  ";(size%+500)DIV1000;"k"
410 INPUT"Which numbered file   "file%
420 IF file%>T% THEN VDU7,11:PRINTSPC(
30):VDU11:GOTO 410
430 IF file%=0 THEN RUN
440 N%=EXT#OPENIN name$(file%-1)
450 CLOSE#0
460 IF N%>9500 THEN MODE 7
470 PROCoscli("KEY9LOAD "+name$(file%-
1)+"|M*KEY9|M")
480 PROCview
490 END
500 :
510 DEF PROCintro
520 CLS
530 PRINTTAB(26,8)"1  Catalogue of Fil
es"
540 PRINTTAB(26,10)"2  VIEW Word Proce
ssor"
550 PRINTTAB(28,13)"which option ... "
;
560 IF GET=50 THEN PROCview:END ELSE C
LS
570 PRINTTAB(29,8)"Catalogue of Files"
580 PRINTTAB(29,9)STRING$(18,"_")
590 PRINTTAB(29,11)"Current drive"SPC(
4);D%;
600 PRINTTAB(29,13)"New drive"SPC(8);
610 drive%=GET-48
620 IF drive%>-1 AND drive%<4 THEN D%=
drive%:PRINT;D%:PROCoscli("DR."+STR$(D%)
)ELSE PRINT;D%
630 PRINTTAB(25,20)".. assembling cata
logue .."
640 ENDPROC
650 :
660 DEF PROCoscli(cline$)
670 $buf%=cline$
680 X%=buf%
690 Y%=buf% DIV 256
700 CALL oscli%
710 ENDPROC
720 :
730 DEF PROCview
740 PROCoscli("KEY0*DR.0|M*TY.help|M*D
R."+STR$(D%)+"|M")
750 *KEY1SCREEN|M
760 *KEY2SAVE S-A-F-E|M*FX3,3|M*A.S-A-
F-E L|M*FX4,2|M*FX3,0|M
770 :
780 REM if no printer/driver,then
790 REM delete lines 810 and 850
800 :
810 PROCoscli("KEY3*DR.0|MPRINTER DAIS
Y|M*DR."+STR$(D%)+"|M")
820 *KEY10OLD|MMODE3|M
```

Continued ►

◀ *ViewSuite continued*

```
 830 *KEY11*A.S-A-F-E!MSAVE S-A-F-E!M*A
S-A-F-E L!M*FX4,0!M
 840 *FX 138,0,137
 850 *FX 138,0,131
 860 *FX 12,6
 870 *FX 11,15
 880 :
 890 REM If "help" is needed each time
 900 REM VIEW is entered, delete REM
 910 REM in line 930
 920 :
 930 REM *FX138,0,128
 940 *WORD
 950 ENDPROC
 960 :
 970 DEF PROCmakecode
 980 osword=&FFF1
 990 FOR Z%=0 TO 2 STEP2
1000 P%=readcat
1010 [OPT Z%
1020 LDA #&7F
1030 LDX #blk MOD 256
1040 LDY #blk DIV 256
1050 JMP osword
1060 .blk:]
1070 ?P%=D%:P%!1=buffer%:P%?5=3:P%?6=&5
3
1080 P%?7=0:P%?8=0:P%?9=&22:P%?10=0
1090 NEXT
1100 ENDPROC
1110 :
1120 DEF PROCdecode
1130 E%=(buffer%?&105)/8
1140 DIM name$(E%-1)
1150 FOR Z%=0 TO E%-1
1160 FOR Y%=0 TO 6
1170 name$(Z%)=name$(Z%)+CHR$(buffer%?(
Y%+8*(Z%+1)))
1180 NEXT
1190 G%=buffer%?(Y%+8*(Z%+1))
1200 IF G%>127 THEN G%=G% AND &7F
1210 name$(Z%)=CHR$(G%)+"."+name$(Z%)
1220 NEXT
1230 ENDPROC
1240 :
1250 DEF PROCprint
1260 IF T%=0 THEN CLS
1270 name$(T%)=name$(Z%)
1280 IF safe THEN PRINT STRING$(79,"=")
1290 PRINT T%+1 TAB(3)name$(T%)TAB(13);
1300 PTR#N%=PTR#N%+2
1310 FOR C%=1 TO 63
1320 F%=BGET#N%
1330 IF F%=13 THEN C%=64 ELSE PRINT CHR
$(F%);
1340 NEXT
1350 PRINTTAB(77)(EXT#N%+500)DIV 1000
1360 IF safe THEN PRINT STRING$(79,"=")
1370 T%=T%+1
1380 IF T%=20 THEN VDU7:PRINT'".. ANY k
ey to CONTINUE ..":IF GET THEN VDU11:PRI
NTSPC(27):VDU11,11
1390 ENDPROC
1400 :
1410 ON ERROR OFF
1420 CLOSE#0
1430 MODE 7
1440 REPORT:PRINT" at line ";ERL TAB(0,
10)"Program dead - SHIFT/BREAK to restar
t"
1450 *FX 12
1460 END
```

Listing 2. Modifications for use with *Disc Doctor*'s SWAP format

```
 35 REM plus Disc Doctor SWAP files
 315 IF name$(Z%)="!.!!!!!!!"THEN size%
=size%+512:GOTO360
 385 IF ?&E00=42 THEN S%=?&E01 ELSE S%=
32
 395 PRINT" "CHR$(S%);:IF S%<>32 THEN P
RINT" (*SWAP format)";
 595 PRINT" "CHR$(S%)
 596 Y$="":IF S%<>32 THEN PRINTTAB(29,1
3)"Swap files (Y) ";:Y$=GET$:IF Y$="Y" P
RINT"YES"
 597 IF Y$<>"Y" THEN GOTO 600
 598 *SWAP
 599 ENDPROC
```

With a little help from my Clone

TOP of the List returns this month with a useful little utility from J Clarke.

Clone allows you to make a copy of a file on the same disc, something most disc filing systems are unable to cope with. The listing is written in assembly language but includes a checksum which will inform you of any mistakes. If all is well the program will save the machine code to your disc under the filename CLONE. It's worth keeping a copy of the source program itself in case you want to make any modifications at a later stage. Call this S.CLONE.

To use the utility simply insert the disc and type:

*CLONE <afsp1> <afsp2>

where <afsp1> is the file you wish to clone and <afsp2> is the name of the new file.

The program works by reading and writing 255 bytes at a time from one file to the other. File attributes are also copied, so if the original program is locked, the cloned program will be as well.

*CLONE is a useful utility for sideways RAM users to add to their répertoire. No doubt you'll even be cloning Clone!

Clone makes a copy of a file on the same disc

```
   10 REM Clone
   20 REM by J. Clarke
   30 REM for BBC/Elec
tron with Plus 3
   40 REM (c) Acorn Us
er Sept. 1985
   50 :
   60 asc=&80
   70 pblock=&70
   80 FOR T%=0 TO 2 ST
EP2
   90 P%=&900
  100 :
  110 [OPT T%
  120 .enter
  130 LDA #1
  140 LDX #&80
  150 LDY #0
  160 JSR &FFDA
  170 LDY #0
  180 .loop0
  190 LDA (&80),Y
  200 STA readname,Y
  210 INY
  220 CMP #&0D
  230 BEQ error
  240 CMP #&20
  250 BEQ ng
  260 CPY #12
  270 BNE loop0
  280 DEY
  290 .ng
  300 LDA #&0D
  310 STA readname,Y
  320 LDX #0
```

Continued ▶

◀ Clone listing continued

```
  330 .loop01
  340 LDA (&80),Y
  350 STA writename,X
  360 INX
  370 INY
  380 CPX #12
  390 BEQ error
  400 CMP #&0D
  410 BNE loop01
  420 JMP open
  430 .error
  440 BRK
  450 ]
  460 ?P%=0:P%=P%+1
  470 $P%="Syntax: CLO
NE <afsp> <afsp>"
  480 P%=P%+LEN($P%)
  490 [OPT T%
  500 BRK
  510 .open
  520 LDA #&40
  530 LDX #readname MO
D256
  540 LDY #readname DI
V256
  550 JSR &FFCE
  560 STA rhandle
  570 CMP #0
  580 BEQ nofile
  590 LDA #&80
  600 LDX #writename M
OD256
  610 LDY #writename D
IV256
  620 JSR &FFCE
  630 STA whandle
  640 .main
  650 .loop2
  660 CLC
  670 LDY rhandle
  680 JSR &FFD7
  690 BCS atts
  700 LDY whandle
  710 JSR &FFD4
  720 JMP loop2
  730 .atts
  740 LDA #0
  750 LDY #0
  760 JSR &FFCE
  770 LDA #readname MO
D256
  780 STA pblock
  790 LDA #readname DI
V256
  800 STA pblock+1
  810 LDX #pblock MOD2
56
  820 LDY #pblock DIV2
56
  830 LDA #5
  840 JSR &FFDD
  850 LDA #writename M
```

Continued ▶

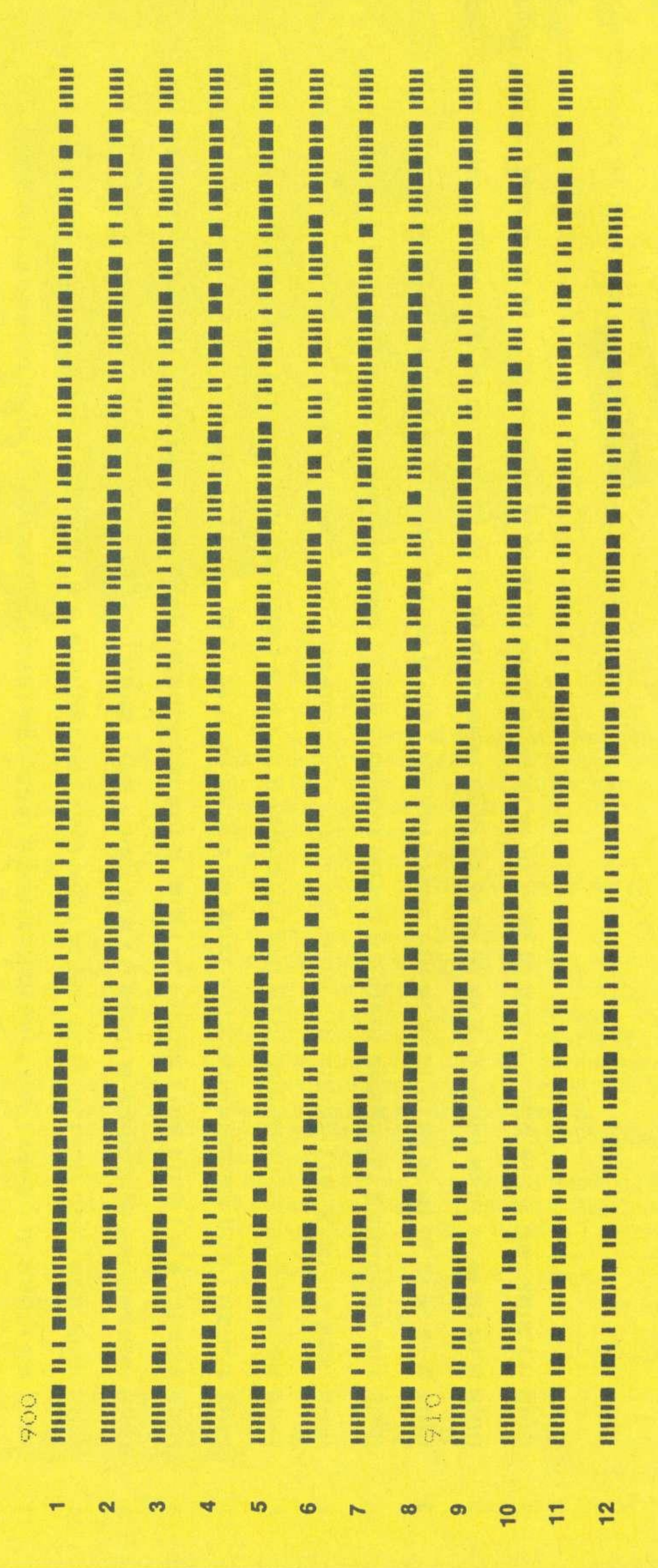
◀ Continued

```
OD256
  860 STA pblock
  870 LDA #writename D
IV256
  880 STA pblock+1
  890 LDA #1
  900 JSR &FFDD
  910 .cl
  920 LDA #0
  930 LDY #0
  940 JSR &FFCE
  950 RTS
  960 .nofile
  970 JSR cl
  980 BRK
  990 ]
 1000 ?P%=0:P%=P%+1
 1010 $P%="File not fo
und"
 1020 P%=P%+LEN($P%)
 1030 [OPT T%
 1040 BRK
 1050 .message
 1060 .rhandle
 1070 BRK
 1080 .whandle
 1090 BRK
 1100 .readname
 1110 BRK
 1120 ]
 1130 :
 1140 writename=P%+15
 1150 NEXT
 1160 :
 1170 REM Checksum
 1180 tot%=0
 1190 FOR X%=&900 TO (
P%-1)
 1200 tot%=tot%+?X%
 1210 NEXT
 1220 IF tot%<>22423 P
RINT"Checksum error -
please check listing":
END
 1230 :
 1240 DIM oscli% 40
 1250 $oscli%="SAVE CL
ONE 900 "+STR$~(P%+1)+
" FFFF0900 FFFF0900"
 1260 X%=oscli%:Y%=osc
li% DIV 256
 1270 CALL &FFF7
```

Don't forget all listings are available on our monthly cassette and in bar code format – see pages 96 and 113 for details.

PLUS you can ensure you've typed the listings in correctly by sending off for our checksum booklet – details on page 101.

Mode 0 screen dump



Blasts from the past!

The two bar code listings this month are from the bad old pre-bar code days.

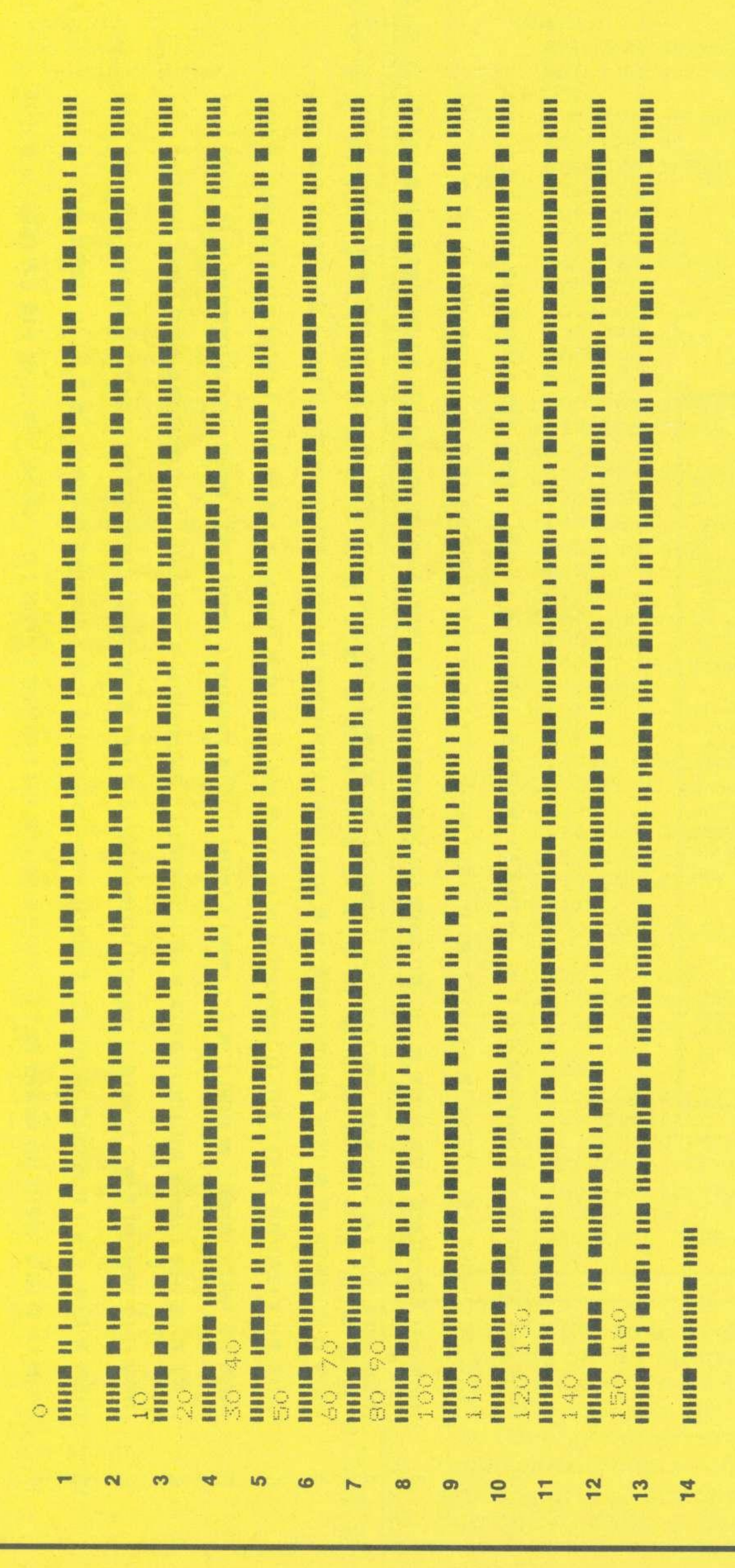
Listing 1 is from the September 1984 issue and is a two line mode 0 screen dumper! Supplied by Mr Beeston it will dump a mode 0 screen to an attached printer in under five minutes.

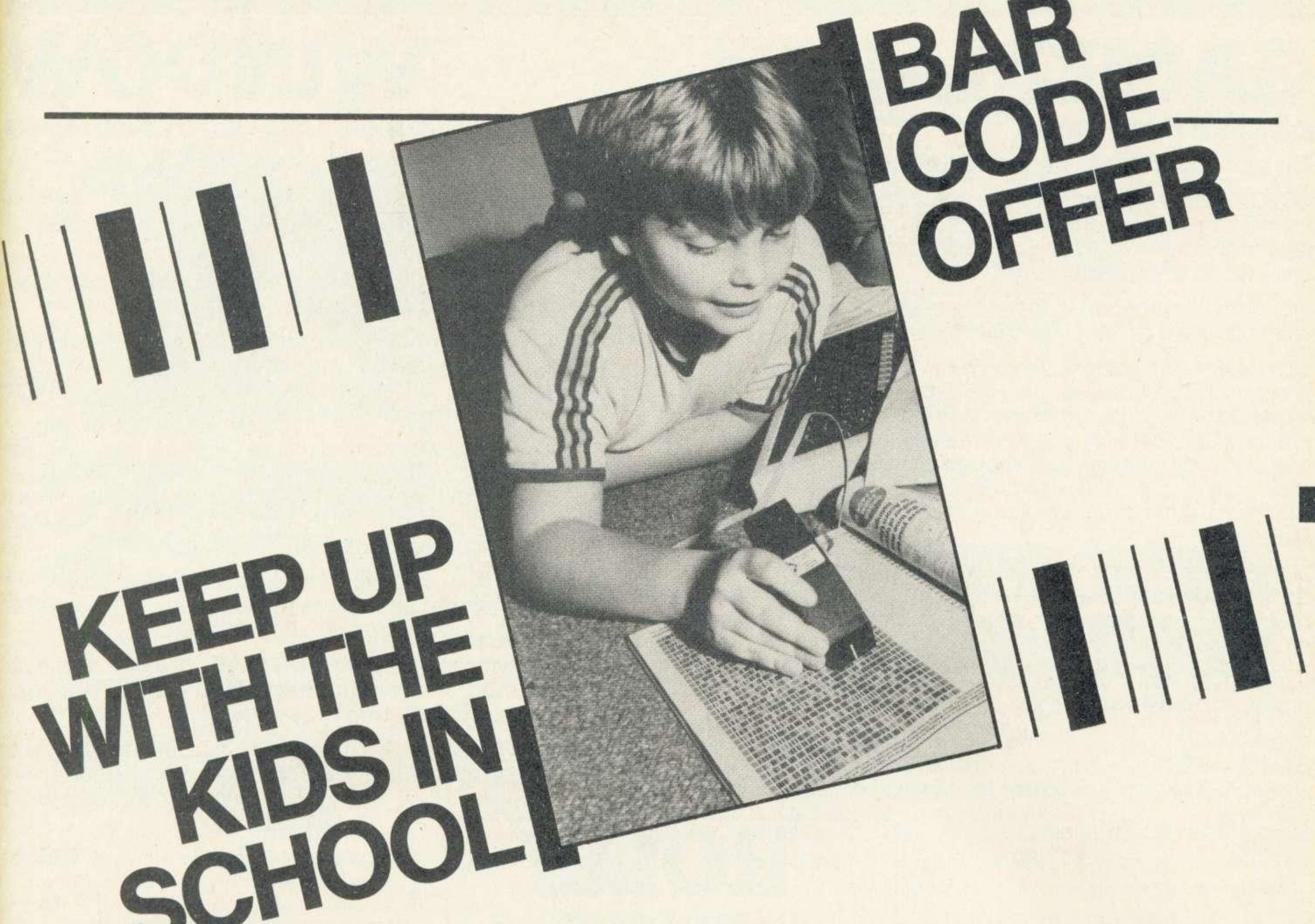
Listing 2 comes from the June 1984 issue and allows you to auto-run your Basic programs. Simply RUN the program: the machine code is saved behind the REM in line 0. Delete lines 10 to 160. Add line 0 to the start of your programs and *SAVE them with:

*SAVE <name> <PAGE> <TOP> <PAGE+6>

where name is the file-name, PAGE is the hex value of PAGE and TOP is the hex value of TOP, ie, PRINT ~PAGE, ~TOP

Routine to auto-run Basic programs





BAR CODES will revolutionise the way we use computers in applications as well as the way we load data. Here is the chance to get experience of this important development by ordering the Addison Wesley/MEP Bar Code Teaching Pack (see our January issue, page 129) direct through *Acorn User*.

These BBC micro bar code readers are being offered to schools first and versions will not be available to the public in the shops until later in the year – when they will certainly cost more. However, because of its active involvement in the scheme *Acorn User* is able to offer the Teaching Packs direct to readers at the introductory price of £49.95 plus £2.95 post and packing (plus VAT).

Acorn User will be printing some listings in bar code format in each issue and making booklets of bar codes available by mail order.

Book publishers are already printing listings in bar code format, in fact Bruce Smith's latest book *The BBC Micro Machine Code Portfolio* has 13 pages of bar code listings.

So, to stay ahead of the latest development in computers and education, send off for a pack from *Acorn User* today. *See page 103 for offer of magazine listings in bar code format.*

The pack includes:

★bar code reader
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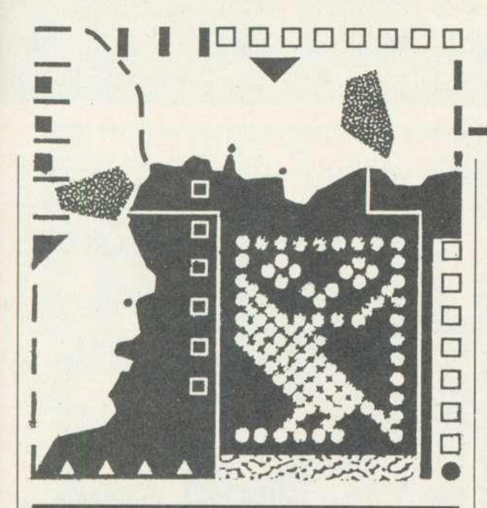
* A Copier to load into a ROM from normal RAM or to load normal RAM with the contents of a ROM.

* An Analyser to peek into a ROM header showing title, copyright message and all service calls answered along with the locations jumped to.

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Send for free hardware/software catalogue



A routine for assembler buffs, a tip for Epson printer owners, and musical function keys are the topics in Bruce Smith's forum

£20

One for all assembler buffs

ASSEMBLER buffs will be very interested in the following submission by Mr Waddington of Leeds, who supplies an EQU function that allows you to generate floating point constants in the same way EQUB, EQUW and EQUD do (listing 1). The FN definition is a little involved as there is no floating point indirection operator. It operates by relying on the fact that the variable descriptor block for each argument is on the stack while the function is operating, as Mr Waddington explains...

The address of the floating point value can be extracted and used to copy the value to a fixed location. The state of the stack when the double indirection of line 80 is being evaluated is:

Top: 0 Descriptor for I% (from I% =)
4 Descriptor for I% (from LOCAL)
LOCAL)
8 Global value of I%
12 Descriptor for OPT%
16 Global value of OPT%
20 Descriptor for value
24 Global value of value
29 Pre-existing stack entries

The 16-bit address of the value is in the first two bytes of its descriptor and thus lies at STACK+20. This address is obtained in the local variable I%, and used to copy five bytes across to the current code pointer using the conventional indirection operators.

```
 10 REM Floating point pseudo-op
 20 REM for BASIC embedded assembler
 30 REM BBC Micro and Electron
 40 REM (C) Andrew Waddington 6/7/85
 50
 60 DEF FN_EQUF(value,OPT%)
 70 LOCAL I%
 80 I%=!(((!4)AND&FFFF)+20)AND&FFFF
 90 !P%=!I%
100 P%?4=I%?4
110 P%=P%+5
120 IF OPT%>3 O%=O%+5
130 =OPT%
140
150 REM Use as :
160 [OPT PASS%
170 .root2:OPT FN_EQUF(1.4142,PASS%)
180 ]:REM etc.
```

Listing 1. Generating floating point constants

Funk-tion keys

VIEW users might be interested to learn that it is quite easy to program music into the function keys using a series of *FX commands. The commands can be typed in directly in command mode, or better still form part of a !BOOT file.

```
*K.0 *FX213,100|M|G
*K.1 *FX213,108|M|G
*K.2 *FX213,116|M|G
*K.3 *FX213,120|M|G
*K.4 *FX213,128|M|G
*K.5 *FX213,136|M|G
*K.6 *FX213,144|M|G
*K.7 *FX213,148|M|G
*K.8 *FX213,156|M|G
*K.9 *FX213,164|M|G
```

Use *FX commands to program music into the function keys

Simply press the function keys in Command mode to hear the muzak! Thanks to Orlando for this one!

£5

Coming to your ADE

USING the ADE editor frequently has caused J E Bowen of Birkenhead to investigate a method of using the function keys just as you would in Basic. Over to Mr Bowen...

Normally the function keys, alone or with Shift, give various commands.

However, using CTRL with the function keys does not give anything specific, but it is possible to use this combination to produce character or command strings.

To do this it is necessary to use the command *FX 227,1. You can then program the function keys in the normal way.

When using the function keys for commands the sequence |[should be used for Escape in a similar way to |M in Basic.



Descender on the up

STEPHEN Allen from Moreton-in-Marsh has a useful program for Epson owners. He writes...

After having used my Epson FX80 printer for a long time I found that the descenders were becoming very faint. I was told by a dealer that this was because the replacement ink cartridge was not made by Epson, and contained ink of a different consistency. The problem was caused by the ninth pin, which is only used with descenders, which was sticking.

To solve this problem I wrote a short routine (listing 2) to re-define the letter 'A' so as only to use the bottom two pins. The program then prints the letter 'A' which exercises the ninth pin and so stops it sticking. Now whenever the descenders start disappearing I run the program a few times until they come back again.

```
 10 REM " EPSON Descenders "
 20 MODE 7
 30 VDU 2
 40 REPEAT
 50 READ value
 60 IF value = 99 THEN GOTO 80
 70 VDU 1,value
 80 UNTIL value = 99
 90 FOR loop = 1 TO 5
100 VDU 1,27,1,71
110 PRINT STRING$(80,"A")
120 VDU 1,27,1,72
130 PRINT STRING$(10,"AAAAypqg")
140 NEXT
150 VDU 3
160 END
170
180 DATA 13,27,33,2,27,58,0,0,0,27
181 DATA 37,1,0,27,38,0,65,65,10,3
182 DATA 3,3,3,3,3,3,3,3,3,99
```

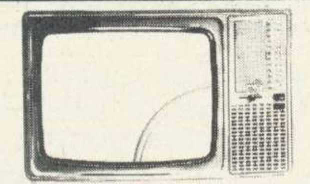
Listing 2. Exercises for your printer pins

Beeb Forum is a platform for ideas, tips and applications relating to the BBC micro and the Electron, intended for experienced programmers to share their thoughts. For every reader's tip published we pay £5 – or more for something special. Contributions should be typed or printed, with substantial listings on cassette. WRITE TO Beeb Forum, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

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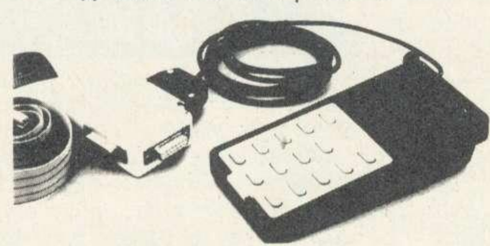
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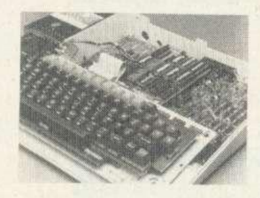
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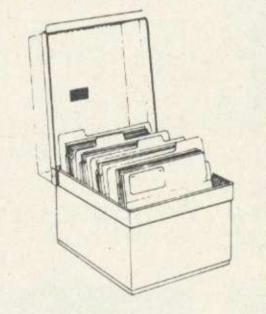


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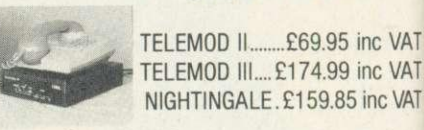
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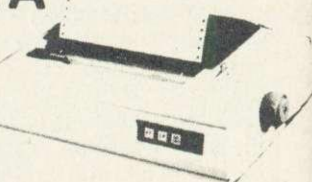
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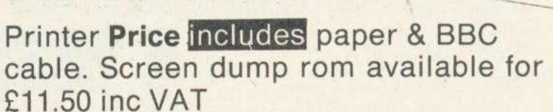


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RELOCATION SCHEME

Adapt your software to use the second processor's extra memory with Peter Higginbotham's program

AT FIRST sight, the addition of a 6502 second processor with its 64k of RAM would seem to provide as much memory as anyone could reasonably ask for. Closer inspection, however, reveals that things are not as simple as they seem, particularly when it comes to actually being able to make full use of all that extra memory.

Let's take Basic as an example of how things work. When you run standard Basic with the second processor, the Tube operating system copies the 16k Basic ROM across from the main machine to the corresponding memory locations in the second processor (addresses &8000 to &BFFF). After subtracting the 2k of second processor memory which is by the Tube, and the bottom 2k which is used for language and system workspace, the user is left with 30k of memory below Basic and 14k above, giving 44k in total. Memory for the screen display, input/output operations, etc, is, of course, now all taken care of by the main machine – now termed the I/O processor.

Having our memory in two separate chunks is not particularly convenient, although in the case of Basic you use the upper chunk for storing variables by setting LOMEM and HIMEM to &C000 and &F800 respectively. A much more satisfactory answer would be to move Basic up to the top of memory, so that our 44k is in one continuous block. Enter Hi-Basic!

Hi-Basic is supplied with the second processor, and is essentially the same as the normal Basic (Version II), except that it is assembled to run 14k higher up in memory (addresses B800 to F800). The ROM also contains a 'flag' to tell the operating system that it is to be relocated when run on the second processor (the ROM type byte at location 06 of the ROM has bit 5 set), and gives the base address to be used (following the ROM copyright text). Hi-Basic cannot, however, be used without the second processor.

Once the language is running on the second processor, it can normally be *SAVEd to disc, then when required on future occasions, it can be reloaded and run without the original ROM being present.

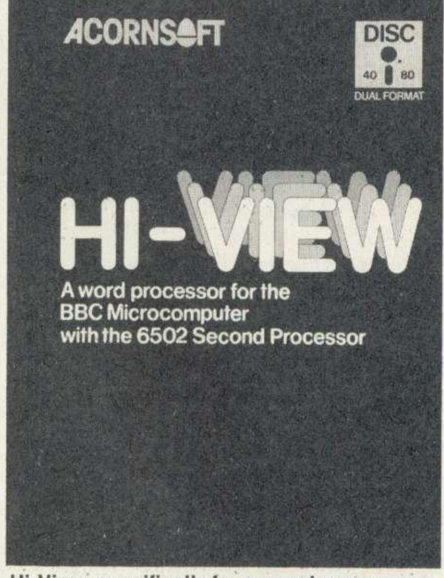
Acornsoft seems to be pursuing the policy of having separate 'Hi' versions of their software with the recently released *Hi-View*. The latest version of the BBCSoft *Ultracalc* ROM, on the other hand, relocates itself when run on the second processor but still runs on the standard machine. The ideal solution, however, would be the ability to relocate ROMs for oneself.

Absolute addresses

What then is the difference between code in a normal ROM and code that has been relocated upwards? Essentially, all the references to *absolute* addresses within the memory space occupied by the ROM have been incremented. In the case of Hi-Basic the start address of the code is upped from &8000 to &C800, an increase of &3800. Thus, any references to addresses between &8000 and &BFFF need &3800 adding to them.

The author of a program has only to specify a different origin to the 6502 assembler (eg, using P% in BBC Basic) and the resulting machine-code will be automatically relocated correctly. Performing this relocation on the already assembled machine-code is, however, a much trickier process. To understand the principles involved, we need to take a look at the 6502's instruction set.

The machine-code instructions of the



Hi-View: specifically for second processors

6502 processor consist of one-byte operation-codes (opcodes) some of which are followed by a one or two-byte operand. One-byte operands may be data values, page-zero addresses, or relative addresses for a branch instruction. Two-byte operands, on the other hand, are always explicit absolute addresses stored with the least significant byte first, followed by the most significant byte (also known as the page number).

The relocation process has much in common with that of program disassembly. Both involve examining each instruction in turn, finding out the length of the operand (if any) and evaluating it.

A disassembler program displays the instruction and operand in a form resembling that written by the original programmer, so that the program and its operation may be understood.

A relocation program, however, aims to modify the code to run at a new location. In the simplest case, this involves adding an appropriate offset to each two-byte address and storing the new value. If the offset is a whole number of pages, then only the final byte need be modified.

To make this clearer, let's look at an example. The instruction

```
JMP &8165
```

is assembled as

```
4C 65 81
```

In relocating code from a starting address of &8000 to one of &B800 an increment of &38 pages is required giving

```
4C 65 B9
```

There are several complications which usually prevent the complete auto-

mation of the relocation process. The first type of problem lies in address references which are made indirectly. For example, with an indirect jump such as

```
JMP (&300)
```

it's necessary to find out the address that has previously been stored in locations &300 and &301. This may have been set up elsewhere in the program with a piece of code such as

```
LDA #&65
STA &300
LDA #&81
STA &301
```

so that the effective jump is to &8165. Relocating this code involves adding the appropriate offset to the operand of the second LDA instruction if it refers to a page within the memory range occupied by the ROM. The data set up by this 'double-store' sequence might, of course, be something other than an address (eg, a two-byte counter), and the X and Y registers could be used instead of the accumulator. Such details can only be determined by disassembling the program. The discovery of an instruction such as JMP (0300) would usually confirm the function of locations &300 and &301.

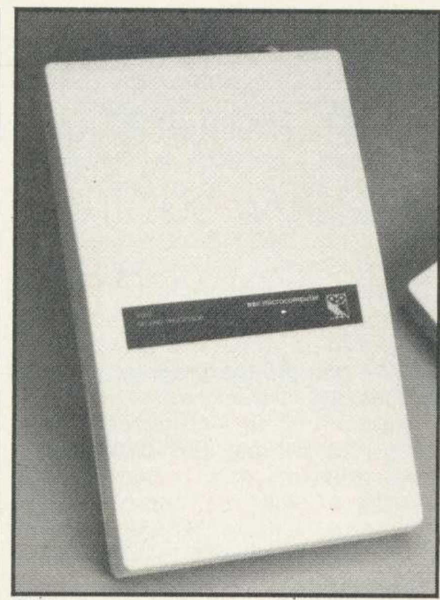
Some programs use the technique of 'pushing' an address onto the stack (high byte first), and then doing a JMP (rather than a JSR) to a subroutine. The return from the subroutine is to the stacked address (plus 1), eg:

```
LDA #&81
PHA
LDA #&64
PHA
JMP subroutine
```

returns to address &8165. In this case the operand to the LDA preceding the first PHA instruction needs to be offset. The process is one that can be automated, but exercise caution since 'double-pushes' can be used for other purposes.

Yet another complication is the occurence of blocks of data in the code to be relocated. These include such things as text strings and look-up tables, and can cause problems for both disassembly and relocation. When you try to disassemble blocks of data the results are usually gibberish because the disassembler is trying to interpret data values as instructions and operands. In practice, this is quite useful because it reveals the presence and position of such data.

While some programs store all text strings in a block, perhaps at the end of the program, others use an output routine called by a JSR followed by the text string which may terminate in a &00,&FF or &0D byte. The output routine returns to the address following the text. With the Basic 2 assembler, this might be programmed as:



6502 second processor: extra memory

```
JSR message
EQUS 'Hello'
EQUB 0
```

For a disassembly or relocation program to keep track, it needs to know the address of the 'message' routine. When this is encountered, it knows to skip through the text until it comes to the zero byte. Without this information, a relocation routine may miss giving an offset, or give one in the wrong place.

Another common type of data block is a 'despatch table' – a list of two-byte addresses, one of which is used according to the value of some variable (rather like the ON. . .GOTO structure in Basic). For example, each keyword in a language may have its own despatch address. There may be separate tables of addresses for 'immediate' commands and 'stored' commands, and the addresses of the various tables may themselves be stored in a table. Addresses in tables are normally stored low byte first.

The accompanying DISLOC program contains both disassembly and relocation routines which may be used to relocate languages for fuller use of the second processor memory. The term 'language' here also includes wordprocessors, spreadsheets and so on, but not filing-systems, toolkits etc. The main pre-requisite is that the software already runs properly on the second processor in its unrelocated form.

DISLOC will run with or without the second processor connected. As is usual with programs that contain assembly code, save the program *before* running it. DISLOC is mainly menu-driven, and fairly self-explanatory. All memory addresses should be entered in hexadecimal *without* a preceding '&' character.

Using the program

The main steps are:

a) Copy the code to be relocated into RAM. This may be direct from a ROM, in which case the ROM socket number is requested (the rightmost socket in the Beeb is 15) and the highest address to be read (eg, 9FFF for an 8k ROM or BFFF for a 16k ROM, but remember that ROMs may not always be full of code). Allow a couple of minutes to copy a 16k ROM. Previously stored ROM code may also be loaded back from disc or tape. All disassembly and relocation is performed in RAM, but treat the code as if it were actually still in ROM (ie, addresses &8000 upwards).

b) Use the disassembler to establish where the main code ends, where any data tables are located, if there is a standard text output routine, etc. The search facility may be used to find such things as indirect jumps, eg, by searching for occurrences of 'JMP ('. The display is in 'page' mode during disassembly, and all data and addresses are displayed in hex.

c) Relocate the main block(s) of code. DISLOC will relocate the code as high as possible. You can optionally specify that 'double-stores' and 'double-pushes' (in the form described above) are to be modified. All candidates for relocation may be previewed before any actual changes are made, and dubious ones inspected with the disassembler. Once you actually relocate a section of code, remember that any absolute addresses (such as that of the text output routine) may now have been changed.

c) Relocate any despatch tables. The address range specified should be from the first 'high byte' to the last 'high byte' in the table.

d) Relocate any other single addresses that you think need changing but have so far been unchanged.

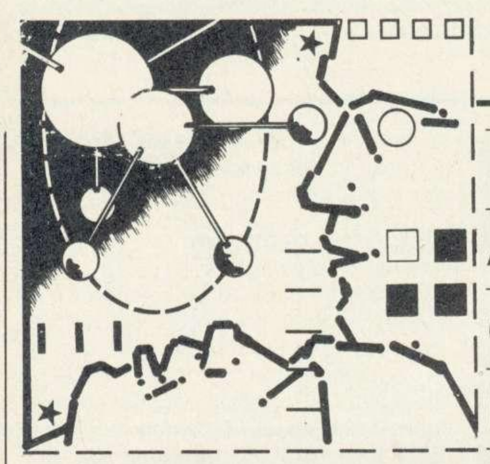
e) *SAVE the relocated code to tape or disc.

f) Try out the new version by typing *RUN name or on disc systems, just type *name.

g) If the relocated code doesn't yet run properly, go back to a) and either reload the relocated code or alternatively start again.

Relocating programs requires a certain amount of patience and detective work. However, if you persevere, the results should be quite uplifting!

Peter Higginbotham's *Disloc* listing is on yellow pages 104–107.



Like to run two programs on the Atom simultaneously? Want Atomic overflow control explained? Then Mike Barwise has all the answers



Running together

ANDRE de Bruin of Holland has sent in a curious program (below) which allows two Basic programs in different areas of memory to time share the Basic interpreter simultaneously. Andre writes . . .

With my program it's possible to run two different Basic programs on the Atom at the same time.

When this program is started, you can use the Atom as normal: you can enter a program at some part of the memory (by choosing: ?18 = <pagenr>, followed by NEW) and RUN it.

If you then press Ctrl and Rept at the same time, the running program stops. You may now enter another program (don't forget to choose another value for ?18 !!!) and also RUN this.

When you now press Ctrl and Shift (at the same time), the last program stops . . . but the first will continue where it was halted when you pressed Ctrl-Rept.

The real fun begins when you press Ctrl-Shift-Rept together – if you do this the two programs are executed at the same time.

For example first RUN the *Duotask* program, then enter:

```
?18 = #29 (So the program will start
from #2900)
NEW
10 PRINT"TO BE OR NOT TO BE "
20 GOTO 10
RUN
```

The screen will fill with text, then enter:

```
CTRL-REPT
?18 = #30
NEW
10 PRINT $7
20 GOTO 10
RUN
CTRL-SHIFT-REPT
```

(A real mess is created if you alter line 10 in the second program to:

```
10 PRINT"THAT'S THE QUESTION ")
```

When the *Duotask* program is started up, it copies the first four pages of memory (address #0 . . #3FF) to another area in memory. These contain all the 'system-variables' used by the Atom and also the stack of the 6502. If you then enter and/or RUN the program, all the information about the (running) program is stored somewhere in the first four pages (information such as: where the program starts, which statement was last executed, etc).

If you press Ctrl-Shift, the earlier stored pages will be swapped with the last used . . .

As it stands, this is a curiosity only, as dual tasking by keeping three fingers on the keyboard is not very realistic, but the concept sparked off some ideas – how about virtual memory handling by routine dumping from disc, for example?

Here's a neat problem for you – find a method of auto-running Basic in a fixed space from a control program written in Basic somewhere else, and then returning to the control program from where it left off. Supposing the existence of several subroutines on disc, find a way of writing a control program that will sequentially load and run a selection of the subroutines in a fixed block of memory.

This is called 'virtual memory handling' and opens the door to programs of almost infinite size, regardless of memory restrictions, as thirty or so subroutines can be held on a disc, and any of them could be accessed any number of times during the overall run.

It is, of course, quite different from 'chaining', which is relatively easy, but constrains you to a preordained sequence of once-only use of each of the routines.

Anyone who comes up with a good answer (I don't know it myself) and provides a tape/disc and listing to back it up will definitely get their effort rewarded by a spot in the Forum and some liquid refreshment tokens.

```
 10 REM ***               DUOTASK          ***
 20 REM *** made by: Andre de Bruin        ***
 30 REM *** Baljuw 11, NAALDWIJK, HOLLAND ***
 40 REM ***                                ***
 50  @=0;DIM VV16,KK16; FOR I=1TO16;VVI=£2800;KKI=£2800;NEXT
 60  PRINT"WHERE CODE ?"'" FIRST BYTE AFTER PROGRAM =";@=0
 70  PRINT&?£23+?£24*£100; INPUT W
 80  INPUT'" WHERE SECOND ZEROPAGE "Z
 90  INPUT'"VARIABLES  : "'"   1=LOCAL , 0=GLOBAL",V
100  PRINT$21; FOR I=1TO2;P=W
110  B=KK7%256;C=KK7/256;D=KK2%256;E=KK2/256
120[    \{ PROGRAM THE 6522 VIA TO GENERATE INTERRUPTS }
130    \{ THE INTERRUPT VECTOR POINTS TO 'KK7'        }
140 :KK0  LDA@£40;STA£B80B;LDA@£C0;STA£B80E;LDA@£50;STA£B804
150       LDA@£FF;STA£B807;STA£B805;LDA@B;STA£204
160       LDA@C; STA£205;CLI;RTS
170
180    \{ CHANGE INTERRUPT-VECTOR: NOW POINT TO ':KK2'     }
190 :KK7  LDA£B804; LDA@D;STA£204;LDA@E;STA£205
200       LDA@1;STA£23F;LDA£B000;PHA
210       TXA;PHA;TYA;PHA;TSX;STX £23E; LDX@0;:KK6;LDA 0,X
220       STA Z,X ,X;LDA £100,X;STA Z+£100 ,X
230       LDA£200,X;STA Z+£200,X;LDA£300,X;STA Z+£300,X
240       INX;BNE KK6;LDA@2;STA£23F;JMP VV9
250
260 :KK2  LDA£B804
270       LDA£B001;CMP@63;BEQ KK4  { IS ctrlshift PRESSED ?}
280       CMP@191;BEQ KK3          { IS ctrl PRESSED ?}
290       JMP KK16
300 :KK3  LDA£B002;AND@64;BEQ KK15
310 :KK16 LDA VV11;CMP@3;BEQ KK12;JMP VV10
320 :KK15 LDA@1;STA VV11;CMP£23F;BNE KK12;JMP VV10
330 :KK4  LDA£B002;AND@64;BEQ KK14
340       LDA@2;STA VV11;CMP£23F;BNE KK12;JMP VV10
350 :KK14 LDA@3;STA VV11 \ { CTRL-SHIFT-REPT WAS PRESSED }
360 :KK12 LDA£B000;PHA; TXA;PHA;TYA;PHA;TSX;STX£23E
370       LDX@0;:KK8;LDA 0,X;STA VV12;LDA Z,X;STA 0,X;LDA VV12
380       STA Z,X; LDA£100,X;STA VV12;LDA Z+£100 ,X;STA£100,X
390       LDA VV12 ;STA Z+£100,X
400       LDA£200,X;STA VV12;LDA Z+£200 ,X;STA£200,X
410       LDA VV12;STA Z+£200,X
420]; IF V=1 GOTO g ;REM {if "global" selected, GOTO g}
430[;     CPX@£22;BPL KK9;JMP KK10
440 :KK9  CPX@£8D;BMI KK11 ; ]
450g[:KK10 LDA£300,X;STA VV12;LDA Z+£300 ,X;STA£300,X
460       LDA VV12;STA Z+£300,X
470 :KK11 INX;BNE KK8
480 :VV9  LDX£23E;TXS; PLA;TAY;PLA;TAX; PLA;STA£B000
490 :VV10 LDA£23F;STA£8000;PLA;RTI
500 :VV11 NOP \{"mode": 1=proces1 2=proces2 3=both }
510 :VV12 NOP
520]; NEXT;PRINT$6
530 PRINT"AFTER break RESTART "'"WITH LINK £"&W'
540 PRINT"TOP OF PROGRAM: £"&VV12+1,'"USED ADRESSES :"'
550 PRINT" £23F  : IDENTIFICATION (1 OR 2)"'
560 PRINT" £23E  : STACKPOINTER"'
570 PRINT" "&VV11"  : STATE"" ",&VV12"  : SWAPBYTE "'
580 LINK W;END
```

Andre de Bruin's *Duotask* program allows two Basic programs in different areas of memory to share the Basic interpreter simultaneously

Atomic overflow control

THIS is not, as you might think at first, the plumber's dream come true, but a powerful hardware facility of the 6502 CPU which has never been widely publicised. Examination of the bus connector on the Atom shows pin 26B connected to a mysterious pin on the 6502 labelled 'SO'. The Atom is, as far as I know, the ony 6502 amateur's micro to have this pin available for use.

By now we are all familiar with the concept of status register bit tests and conditional branches, and most of us are well used to interrupts. The principle behind both is the same – some event is flagged (a hardware line state for the interrupt or a status register bit set as a result of a test) and a branch or jump is executed, pointing the CPU program counter at a new routine. The major difference between the interrupt and the test and branch from the hardware point of view is that the interrupt is the result of an outside world event, and the branch is the result of a software test.

The structure of the response to an interrupt always creates a delay between receipt of the signal at the interrupt pin and the execution of the jump to the relevant routine. This is due to the need to finish the instruction being executed and then store the address the program pointer was looking at when the interrupt occurred, so that the main program can carry on later where it left off. An additional delay is caused if, as on the Atom, the environment requires the interrupt service address to be indirected via RAM. The total delay is somewhat variable but is not under the control of the programmer, and is generally not less than 14 clock cycles (14 microseconds on the Atom). The six cycles taken by the RTI instruction must be added to this, resulting in a 20 cycle overhead before you have done anything useful.

The delay between a valid test on a status register bit and the execution of a branch instruction is, however, easily determinable by the programmer and is much shorter than this. The BRANCH instruction takes three or four cycles to execute. An additional delay of a few cycles is created by the preceding instruction which causes the tested flag to be modified. In software tests, this is somewhat variable (three to seven cycles) depending on the operation type. Even when you add the three cycles needed to close the loop using a JMP or BRANCH, the total is still at worst only half the time needed to start a conditional operation under interrupt. It is obvious that if you are chasing extremely short and relatively frequent events (eg, disc data transfer), the test and branch (device polling) has advantages over the interrupt. This becomes even more evident when the event handling code run time approximates to the inter-event timing.

The Atom DOS is an example of the interrupt solution. The single density data transfer rate is one byte every 64 microseconds. Roughly 58 of each 64 microseconds are used by the interrupt (NMI) driven byte transfer routine, with some 18-20 of that being the jump to routine and RTI themselves. Under polling control the service routine could be reduced to some 28 microseconds in total. It's worth noting that the main routine which is interrupted by the FDC service interrupts should not be doing much more than idling anyway, as you can't work on data which is still being transferred. Furthermore, the foreground time available is only four out of each 64 microseconds average (about time to perform one instruction). Can we do better than this?

So far, the only way an outside world event (eg, a service request from a peripheral chip) can take advantage of the reduced overhead provided by polling is by a conditional flag in a hardware register. This inevitably means an addressing operation, so the polling loop is a minimum of two instructions long: BIT ADDR (four cycles), BRANCH back (three cycles). The resulting seven cycle delay between tests limits the maximum service frequency of the peripheral chip.

A good example is the problem of running a double density disc drive on a 1 MHz 6502 host (eg, Atom). The FDC needs a byte transfer every 32 microseconds in double density, and the transfer must usually be completed within the first 28 microseconds. The shortest possible code to perform a sector transfer by polling takes about 24 microseconds (cycles) per byte, assuming that the polling loop which tests the data request flag of the FDC is passed through only once. However, the CPU (and therefore the polling loop) and the FDC data request are totally asynchronous. It is pure luck if the data request is present the first time the polling loop tests for it. The second time round the polling loop you have added some seven cycles to the service time, making a total of 31 microseconds, which is too long.

If there was a way of substantially reducing the length of the polling loop, it might be possible to accommodate the asynchronicity of the CPU and FDC without going over the top on timings. There is. It's the SO pin.

The SO or Set Overflow pin does just what you'd think: when it senses a signal, it causes the CPU to set its own V or Overflow flag. The V flag is used less than any other flag in general programming. It demonstrates overflow during signed ADC and SBC operations, and it is manipulated by the BIT operation, when it reflects the state of bit six of the tested byte. The V flag is not modified indirectly as a result of any other instruction, and CLV can be used to clear it directly. Thus it proves possible to manipulate the V flag by use of the SO pin and CLV, so long as care is taken not to include any ADC, SBC or BIT instructions in the area of the manipulation.

The SO pin is used in our disc example as a synchronous starter. A wait-for-signal state is created by first clearing the V flag, and then a BVC to itself. This will loop indefinitely until the V flag gets set by the SO pin signal, when the branch will not be taken back, allowing the program to proceed. The branch is normally a three cycle instruction, and the flag is tested during the second cycle. Thus if a signal appears at SO during the first cycle of the BRANCH instruction it will be acted on within one microsecond, otherwise there is a maximum delay of four cycles to the next flag test. The one to four microsecond discrepancy only applies to the last pass through the loop, and can usually be ignored, as the worst response time is practically twice as fast as the conventional polling loop, and vastly better than the interrupt response time. The last two instructions in the service routine must be CLV, BVC START, to re-enter the wait state.

The signal required by the SO pin is a negative going edge (TTL one to zero) during phase one of the microprocessor cycle. To create phase one for gating, it should be sufficient to use the half cycle from the falling edge of phase two plus a couple of TTL gate delays. Treat the SO pin as an open collector line, as the other interrupts.

In the coming months I will be discussing some more esoteric functions of the Atom's 6502 hardware, including the uses of RDY and SYNC.

In the meantime, there are many other possible uses of the SO function, and I would like to present some of your ideas here, so get those thinking caps on. Please make sure they work though, and send a tape or disc with your listing.

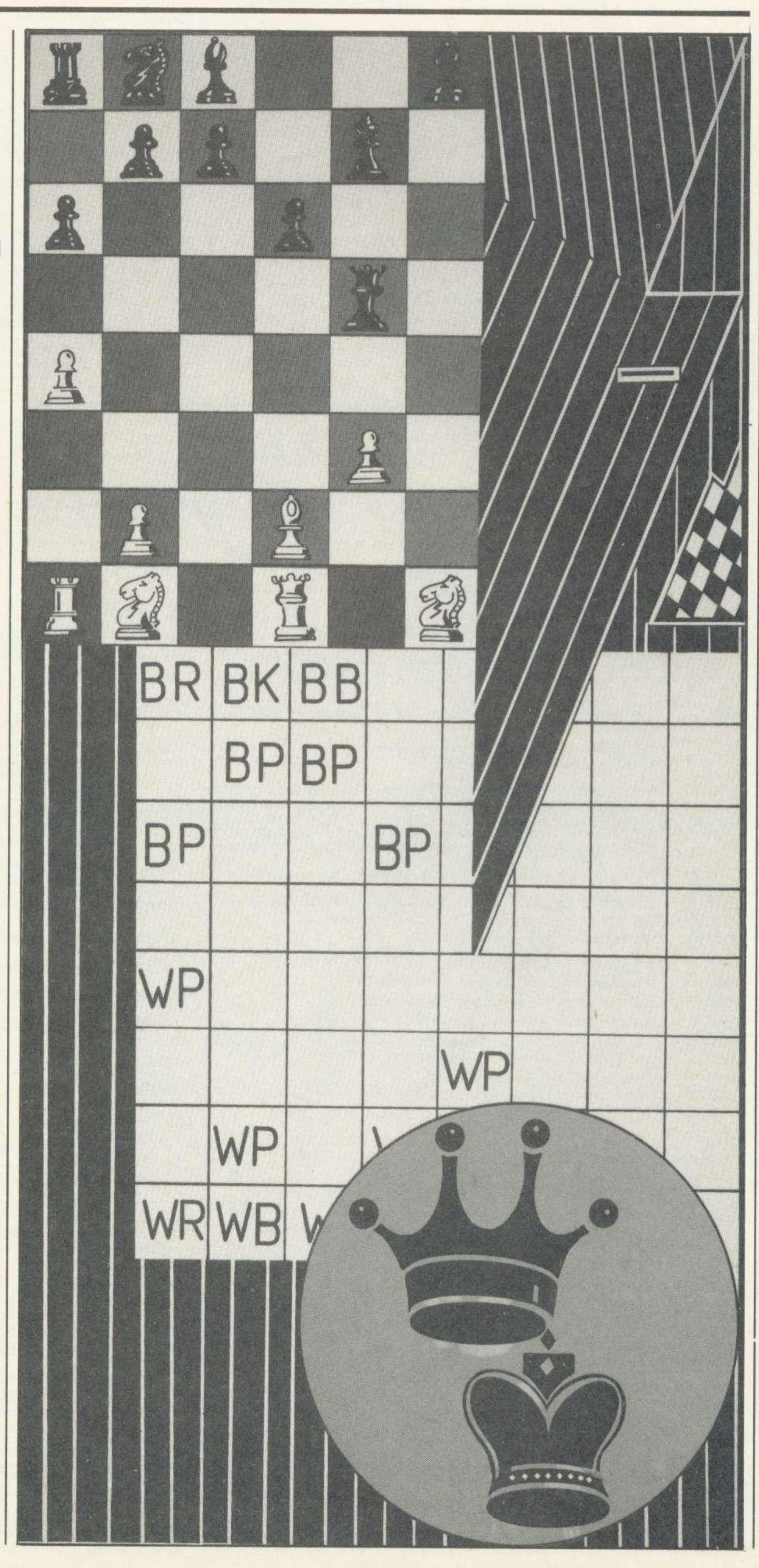
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IT'S NOT ALL WORK AND NO PLAY

CP/M is for games as well as work says Ed Brown



ONE thing every computer can do is play games. Some are designed with games in mind and endowed with excellent graphics facilities and joystick ports. The BBC micro is one such machine and many excellent games exist for it – the majority are still on tape, though more are now appearing on disc.

What sort of games then are available for the Beeb with the Z80 second processor running CP/M?

Since CP/M was designed as a business orientated operating system there is no provision for graphics or a joystick. Some more recent CP/M based machines have started to supply these facilities but this is still far from normal. Hence most of the games that run under CP/M tend to have simple character output, although this does not stop some excellent games being available, and I'll look at some of those currently on offer in the public domain. The vast majority of games written in MBasic that I tried would not run under the Mallard Basic supplied with the Z80 second processor.

ILLUSTRATION BY CHEN LING

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SFIND: Search memory for the occurrence of a specified string.

BFIND: Search memory for the occurrence of any sequence of bytes.

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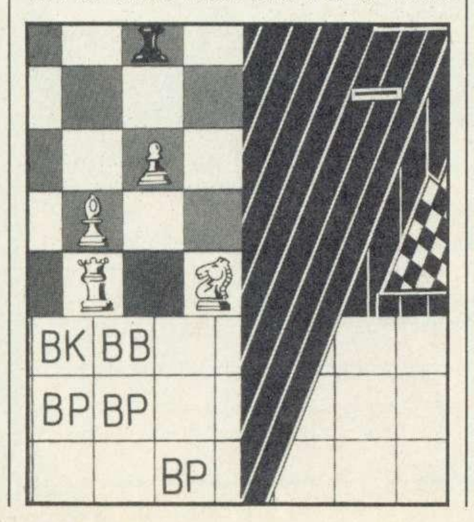
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Dealer Enquiries are Welcome

games where the computer gives you a description of your surroundings and you instruct it what to do next. This type of game is ideally suited to CP/M and probably the best game available in the CP/M public domain is *Adventure*. All the ingredients of a good adventure are there – dark tunnels, hidden treasure, magic, evil creatures, and it has more than its fair share of surprises. The game consists of 191k of program and data so you will find it useful to learn early on how to save a game for playing again later, particularly before entering into a dangerous phase of the game – always assuming you know what's coming next.

It's always difficult to give the flavour of what's in store for the intrepid adventurer without ruining the surprise, so the comments here are limited to general observations on the game and information that you can find out as soon as the game starts. You'll find some more revealing comments and hints on how to play in the box on page 127 (not that I have even reached the stage of junior master yet). First, remember that the computer is acting as your senses – what it tells you is what you would be experiencing if you were there yourself. Second, the micro is always very precise in what it says about your surroundings, so don't jump to conclusions without understanding what your senses are telling you. Third, everything is important, although it may not be obvious. Fourth, as in the real world, don't rely on appearances, they are not always what they seem. Finally, and cryptically, don't be afraid – after all it's only a game.

Chess

As every computer has games, one of them is always a chess program. It does not aspire to a very high standard but will test the ability of most average players. The pieces on the board are represented by abbreviations such as WR for White Rook and WQ for White Queen. I find it easier to have the board beside me than to follow the board on the screen.



Having researched computer chess while I was at college and played machines such as the world champion Belle, I was interested to see how this program played under unusual strategy – try moving a Rook Pawn as your first move and watch what happens. The complete rules as defined in 'The Laws of Chess' are not implemented in the program, however, these finer points are not really necessary for the level of play the program attains.

Golf

An interactive saunter around an 18-hole course with all the challenge of the real thing – the greens, the fairway, the rough (quite a lot of that) and the sand pits are all there for you to negotiate, I found the nineteenth hole the worst – at least in the real thing you can get a drink to recover.

Merchant

This Basic program runs under Mallard Basic and can best be described as a poor man's *Elite* for the Z80. The aim is to buy and sell goods to make a profit, by purchasing items on one planet, then flying to another and selling them to re-finance more deals. When the game starts it displays at the top of the screen, so remember to clear it first.

Newpuz

If you enjoy word search games where you have a grid of letters and have to locate a list of words, this one's for you. Try the sample grid presented here.

Other games

These games are a small selection of those available in the public domain for CP/M – there are versions of other favourites such as *Blackjack, Othello, Startrek, Biorythm, Space Invaders, Dungeons and Dragons,* and *Draughts*. All can be obtained from the CP/M UG (UK) or from Spectronics. Many of them, plus others, are also available on the *Free Software Handbook* discs from Davis Rubin Associates.

Addresses

JCP/M UG (UK), 72 Mill Lane, Hawley, Dartford, Kent. Tel: (0322) 22669.

Spectronic, 138 Holtye Road, East Grinstead, Sussex. Tel: (0342) 313883.

Davis Rubin Associates, 1 Canonbourne, Western-sub-Edge, Chipping Campden, Gloucestershire GL55 6QH. Tel: (0386) 841181.

CP/M WORD SEARCH

D	Q	B	D	O	C	L	I	L	F	A	O	P	Y	J	J	V	B	F	D	G	W	E	D	S
E	Q	L	U	I	B	I	T	U	Y	R	W	P	X	N	R	S	K	A	T	T	Z	O	G	O
M	G	S	R	E	V	I	A	O	Y	Z	S	Y	U	V	Y	F	F	A	Z	Z	K	C	F	P
P	M	T	T	R	N	A	H	P	P	O	Z	N	S	B	S	Y	Z	S	D	I	F	H	B	S
J	Y	B	X	I	X	D	D	E	A	K	R	Y	A	H	L	S	I	R	C	I	H	F	N	D
F	Q	U	P	K	R	K	Q	E	B	F	T	B	X	L	R	I	O	J	L	I	C	D	L	Q
T	A	V	A	A	H	W	W	G	L	C	Q	D	I	Y	P	W	C	E	D	K	S	C	U	P
V	P	C	L	A	K	X	Z	X	M	C	R	F	D	U	S	O	P	D	D	M	V	A	P	B
C	S	L	O	Y	I	L	X	S	U	I	N	I	I	O	D	L	M	G	O	V	A	Y	B	D
T	A	Y	E	R	H	N	D	A	N	U	P	U	Z	W	A	J	K	E	L	M	A	C	R	O
M	Y	L	V	K	N	T	F	Z	O	O	W	C	F	N	V	Q	Y	U	M	T	A	A	J	S
T	U	B	E	F	U	U	G	P	M	Q	J	B	V	C	L	D	C	U	P	A	T	I	X	R
N	E	H	Q	I	N	E	S	E	E	K	V	U	Y	E	V	B	E	A	U	I	K	S	N	U
H	Z	T	T	S	O	A	M	E	Z	Q	B	S	D	T	D	E	U	M	X	D	M	X	Y	B
D	D	V	E	O	X	B	L	F	R	J	O	O	O	A	Q	N	P	G	N	Z	K	P	X	G
Z	G	Q	J	R	R	K	Y	P	F	K	O	A	S	Y	T	S	W	T	M	C	D	E	C	A
U	M	B	Y	E	K	Z	S	T	H	B	L	I	C	W	O	C	H	C	L	F	B	P	E	V
C	L	B	P	F	R	I	F	G	E	P	K	C	M	L	Z	T	O	T	E	Z	F	B	D	K
Q	G	L	A	U	P	U	V	N	O	S	A	S	T	N	A	T	N	U	O	C	C	A	D	N
M	T	Z	O	S	M	G	T	Z	O	K	O	R	B	Y	W	O	C	O	P	Z	L	P	P	I
H	M	Y	B	P	I	E	Q	N	O	O	I	I	G	D	M	O	F	H	L	W	F	C	B	Q
O	X	X	E	L	Z	C	F	S	E	C	O	D	B	T	W	B	E	F	E	O	S	V	J	A
R	Q	W	Z	H	W	G	D	G	I	V	C	E	D	C	R	L	G	U	K	X	B	Q	M	B
J	M	U	S	Q	X	O	I	L	B	B	D	L	V	U	X	E	A	V	H	C	D	O	A	D
M	S	F	W	X	B	T	S	Z	G	E	A	A	K	Z	N	O	X	E	J	X	M	J	C	S

Find these hidden words in the grid:

accountant	acornuser	adventure	basic	bbc
bdos	bios	ccp	cobol	cpm
ddt	fileplan	graphplan	iobyte	mallard
mbasic	memop	memoplan	osword	pinit
publicdomain	tpa	tube	uncledavid	xyzzy

Adventure clues

The house in front of you is where you have to leave all the treasure you find – it's not there just to break up the skyline. Once you are prepared for your explorations you must find your way into the caves – by the way, water flows down.

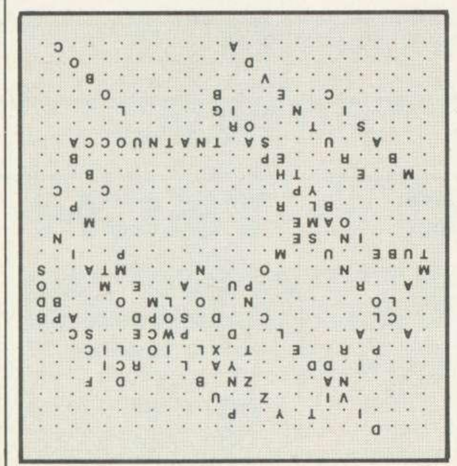
Once in the caves just wander about and see what you can find – pick up everything, you can always drop it again later. The secret of success is working out what to keep and what to discard. You'll learn this lesson early on when you try to catch the singing bird.

Magic is rampant in the caves and you should use every trick in the book and every magic word in your vocabulary to get you out of sticky situations. Some words work once, others can be used several times, but all only help in the right place.

As the computer provides your only information about your surroundings you should read carefully what it says. For example 'all directions' means exactly that but 'all sides' is not the same. When using magic 'nothing happens' is very different from 'nothing obvious happens', which again is very different from something happening! If you get lost, remember that a 'twisty turny' passage is different from a 'turny twisty' passage, and other variations on the theme.

Certain actions can help you in some situations but hinder you in others. Feeding creatures is one way of appeasing them, but if you nourish the wrong ones you'll need to be able to use an axe or sword – presuming you have one, of course.

Well, I think that should be enough to enable you to get to Witts End, see you there . . . now where did I put my lamp? Melenkurion.



SOLUTION TO CP/M WORD SEARCH

CP/M CORNER

Bumper tips for business users by Ed Brown and Richard Clement

Checkpoints

OFTEN when pleas for help or advice are received there is insufficient information for us to provide a detailed reply. When requesting assistance give as much information as possible. If you don't mind being telephoned supply a number and if you want a reply provide a stamped addressed envelope. Below are a few guidelines on giving information about your problem.

1. What is your hardware configuration, type of drives, printer etc.
2. What versions of software are you running. Include ROMs, BIOS, and program name and version.
3. Detail the fault, including what appears on the screen and printer. Send in relevant printer listings.
4. Detail any tests you have carried out and any modifications that you have made to the program.
5. If your problem relates to software try to provide the program.

Before writing try to check the following points:

1. Does the same error occur on a different system?
2. If the program is run from a different drive does it still go wrong?
3. Has the program been keyed in correctly? Check for missing lines, confusion between 0 and O and 1 and I. Also check for incorrectly entered data. Martin Phillips and Bruce Smith have both covered the topic of careful program entry (see August '84 and June and July '85).
4. Does the manual give an example? If so try it and note the results.

Bad sector errors

MICK HUTESON has asked for help as he is getting BDOS bad sector errors on his disc while running *MemoPlan*. Bad sector errors are generated by CP/M and when they occur there are two possible replies: a Return or a CTRL C. If you press Return then CP/M will ignore the error and continue with the program. This can be dangerous as your data may well be corrupted, as is the case with *MemoPlan*. Typing CTRL C will abort the program, and with *MemoPlan* you can use RECOVER to get the scratch file back. Although the problem seems to occur only when using *MemoPlan* this is probably because this package uses more of the disc than the others.

To prove whether or not the drive is at fault the same program should be run from both drives. Remember that the disc that was in the drive when the BDOS error occurred might now have a bad sector due to the original error. Another way of detecting the error is to perform a series of saves to a blank disc in the form SAVE 50 TEST1.ERR. This should highlight the problem and the location.

Bad sector errors should not occur and a simple rule of thumb is to have your drives checked if you get more than one bad sector error a month.

Installed to run

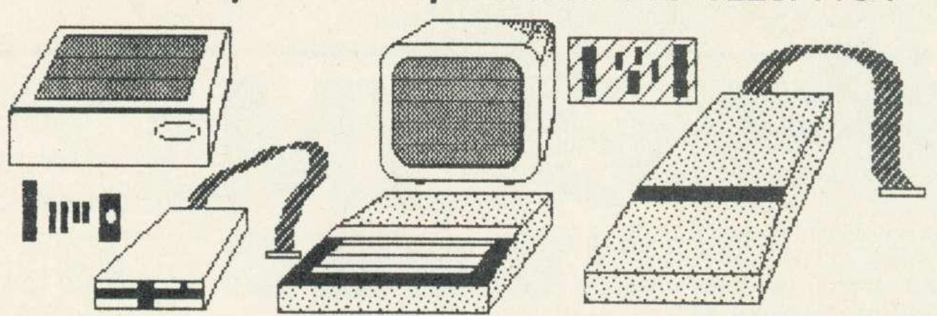
MANY of the problems you write to us about concern software not working as it should on the BBC + Z80. From the few cases we've looked at in detail it would seem that the problem lies in the package not having been installed correctly. Few commercially available CP/M packages run only on a particular machine – the advantage of CP/M is its portability – but most software needs to be properly installed on each machine that it is to run on.

Installation is necessary because, although CP/M provides portability to the extent that all input and output is handled in a standard fashion, it does not cater for the multitude of peripherals that you can attach to the system. Each peripheral has its own set of facilities and commands needed to use them. Control of peripherals such as screens and printers must be handled by the application program. The installation process gives the application the information that it needs to control the peripherals.

MemoPlan shows one of the best ways to accomplish the installation process. In this package the CONFIG program allows you to select the devices you are using from a menu. Unfortunately this is not a universal

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approach and often a thorough understanding of DDT (Dynamic Debugging Tool) and the way the BBC + Z80 works are required to install a package.

As packages are submitted to CP/M Corner for review the installation will be examined and details provided of how to install them if they do not come ready-installed for the BBC + Z80. With the increasing sales of Z80 second processors more companies are likely to invest in having their applications professionally installed for them.



MemoPlan: menu solution to installation problem

GSX documentation

MANUALS for GSX are hard to come by and look likely to remain scarce in the near future. Digital Research, which supplied Acorn with GSX, apparently expected Acorn to publish the manuals and Acorn expected Digital Research to sell them. For some reason Digital Research is reluctant to supply manuals for GSX, although we eventually persuaded them to supply us with the full set of CP/M GSX documentation. This was supposedly dispatched on September 21, 1984 but has yet to arrive, despite repeated phone calls and notification of change of address.

When we get the manuals we will be writing a series of articles on how to use GSX on the Z80 second processor. Until then if you want a copy of the GSX manuals write to Digital Research (UK) Ltd, Oxford House, Oxford Street, Newbury, Berks RG13 1JB, tel: (0635) 35304.

Changing formats

TO answer a series of questions from the Netherlands with regard to the Z80 and disc formats: CP/M is not restricted by the size of the disc drive attached to the system – there are many systems available with 8in and 5.25in drives. Obviously discs of different sizes cannot be used in other drives as they would not fit. However, this is not the end of the problem, for even with the same size of disc it is often difficult to take a disc from one machine and use it on another, as the formatting and density of data storage often differ.

The best way of transferring between two machines is to use a program such as *UKM7*, discussed in last month's CP/M data communications article.

The type of disc interface fitted to the BBC does affect the CP/M, as this is written to use the single-density 8271 controller chip. Slogger Software supplies a double-density version of CP/M that runs on the Opus double-density operating system board, which needs to be installed. We'll be reviewing this in the near future.

Software distribution

SPECTRONIC, 138 Holtye Road, East Grinstead, Sussex RH19 3EA distribute public domain software in addition to the CP/M UG (UK).

Public domain details

JULY'S article on public domain software was attacked by the editor's wandering pen and a couple of errors crept in. First, MSDOS and PCDOS are not Digital Research operating systems. Second the journal of the CP/M UG (UK) is published four times a year, as and when enough articles have been submitted, and not quarterly. Also I miscalculated the number of the discs needed for the software to accompany the *Free Software Handbook* – you require three, not four.

A shady patch

IN the May and June articles some of the input for the patches were left unshaded. Following an Sxxx input the system prompts for input and the third column of numbers should be entered by the user. This can be checked by looking at the area of memory using the D command.

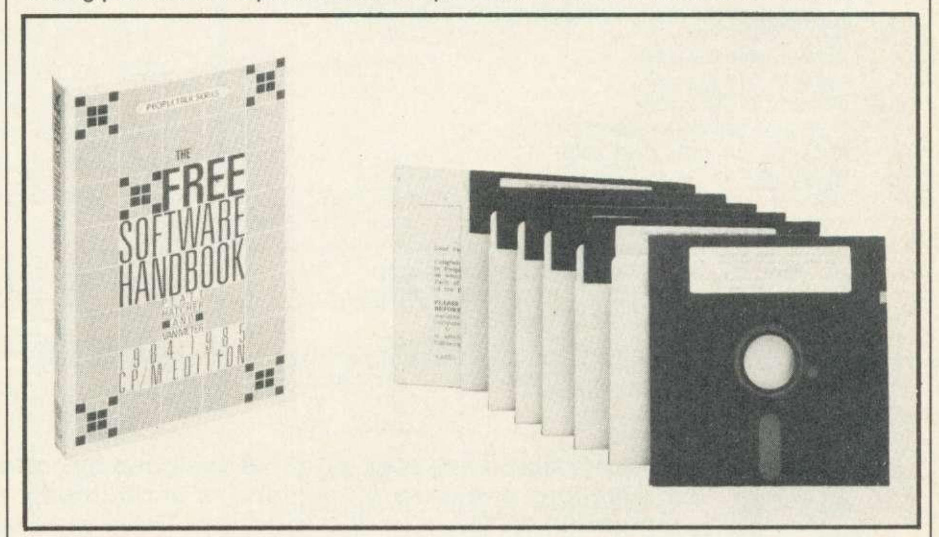
Direct debugging

WITH the run only form of Mallard Basic supplied with the Z80 second processor a limited number of commands will be obeyed in direct mode. The commands which will be obeyed are provided for debugging programs you have developed and are DIR, PRINT, LET, MID$, LSET, RSET, GOTO, GOSUB, SYSTEM.

MSDOS agent

THE CP/M UG (UK) is starting to distribute MSDOS and PCDOS public domain software. Contact them for details.

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Free Software Handbook: accompanying programs require three discs

If you're a CP/M user with problems, or have hints you'd like to pass on, then write to CP/M Corner, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH. If you want advice, please supply as much information as possible, enclose a stamped addressed envelope if you'd like a reply, and give your 'phone number if you don't mind being telephoned.



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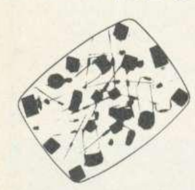
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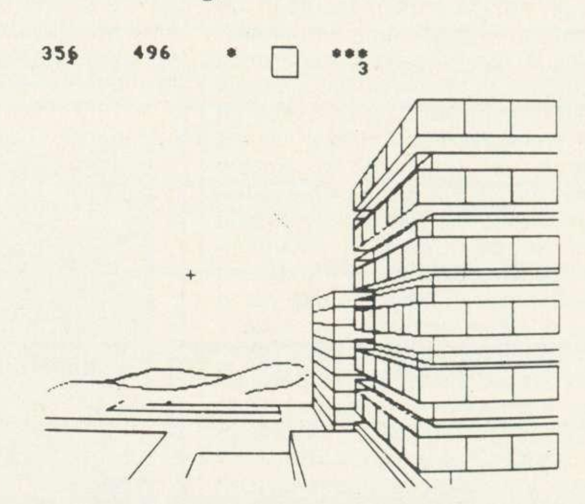
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Unit 4B, Antelope Industrial Estate, Rhydymwyn, Nr Mold, Clwyd CH7 5JH. Telephone: Hendre (035283) 751

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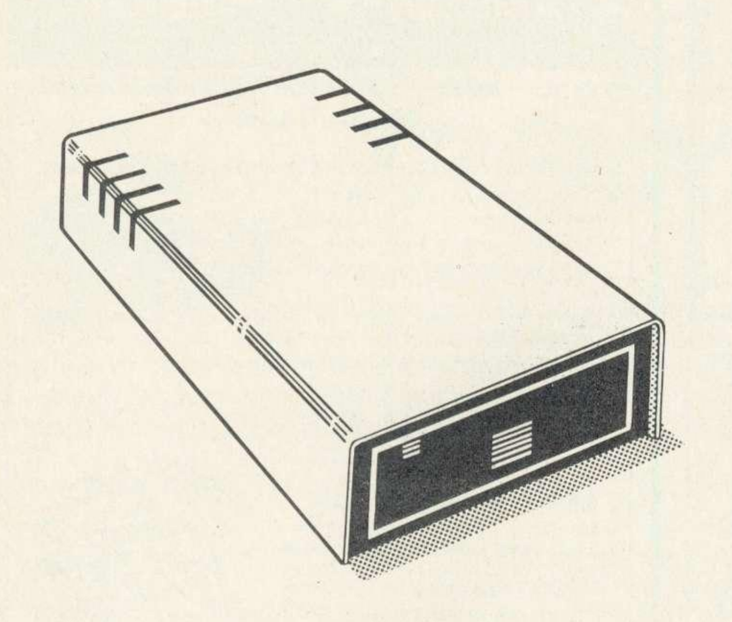




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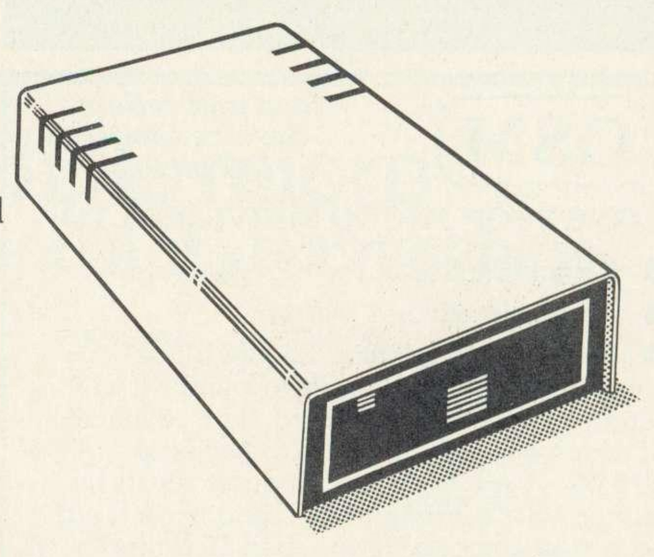
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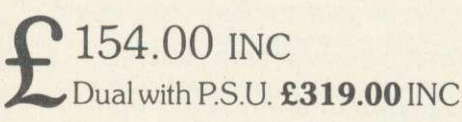
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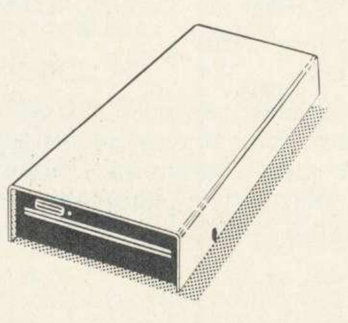
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ON THE TRANSFER LIST

Neil Gordon shows how to convert your programs from *Wordwise* to Basic – or Basic to *Wordwise*

THE BBC micro allows only limited editing facilities for Basic programs. The arrow keys can be used to move the cursor around on the screen, and the Copy key to copy the characters at the cursor to the line being entered. In comparison with using a full-screen editor, this is very clumsy – in particular, it's not possible to scroll up and down through a Basic program to find and edit a section that needs modifying.

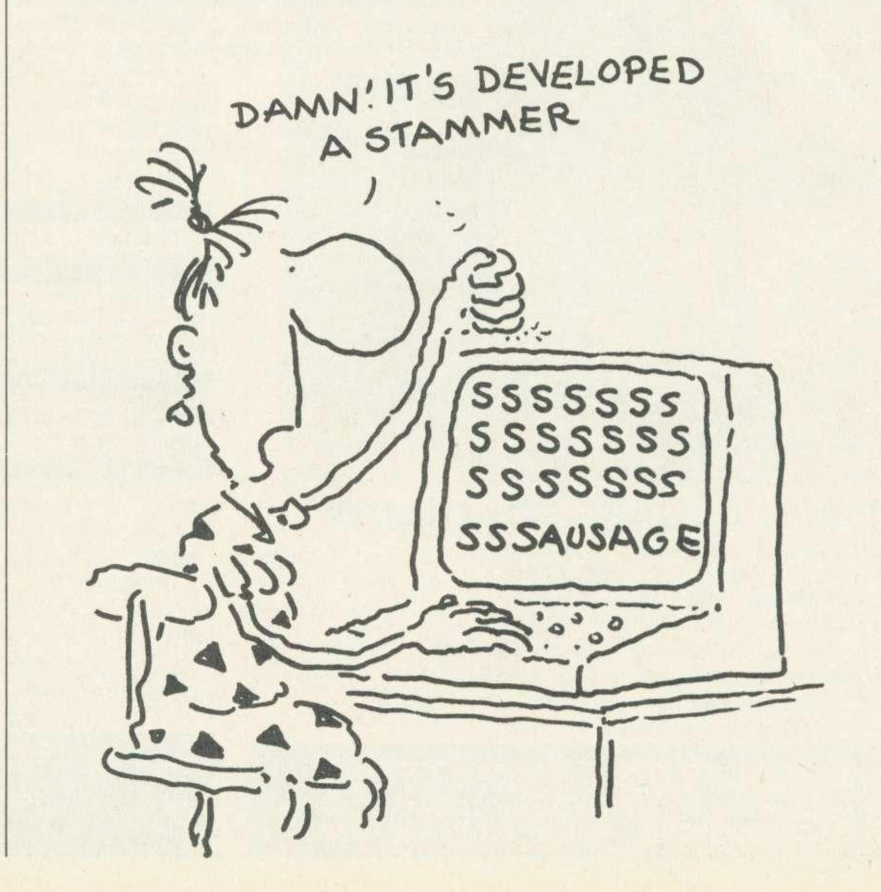
Since I have the *Wordwise* word-processor chip installed on my Beeb, and this incorporates an excellent full screen editor (albeit only in 40 column teletext mode), I wondered whether it could be used to edit Basic programs. Well, according to the *Wordwise* manual it can, but only by a very involved process.

Under Basic, the program text must first be *SPOOLed to tape (or disc), then read in again once the BBC micro has been switched to *Wordwise*. After editing, the text must again be written to tape, then read in after switching back to Basic. This takes a lot of time, especially when using tape. There has to be a better way, I thought, and fortunately there is.

The method I have devised involves intercepting the operating system routines OSWRCH (write a character) and OSRDCH (read a character). To convert the Basic program to *Wordwise* format, a substitute OSWRCH routine is used to write the results of a LIST command into a free area of memory. This listing is then copied into the *Wordwise* text area. Once the program has been edited using *Wordwise*, a substitute OSRDCH routine is used to feed the program to the Basic interpreter one character at a time as if it were being typed on the keyboard. Both conversion processes are very rapid.

The listing gives the program which assembles the machine language routines to do the conversions. It also programs function keys f0 and f1 to call the routines. This version stores the machine code in memory locations &C00 to &CC7, where the user-defined character definitions are stored. You can easily *LOAD the machine code again if you overwrite it by defining some characters.

Let's examine how the program works. PROCinit sets up various locations in memory, PROCassemble assembles the machine language, and PROCkeys programs the user-defined keys f0 to convert from Basic to *Wordwise* and f1 to convert from *Wordwise* to Basic. Once the program has been run, use a *SAVE "EDIT" B00 &CFF com-



ILLUSTRATIONS BY IAN DICKS

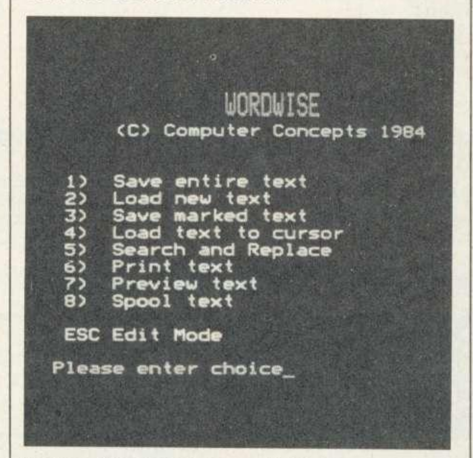
mand to save pages &B and &C to tape/disc. Page &B contains the user-defined key definitions, so when a *LOAD "EDIT" command is used to read the saved data, the keys will be programmed automatically. You should program the keys other than f0 and f1 as desired, either directly or within PROCkeys, before *SAVEing the routine to tape.

To convert from Basic to *Wordwise*, just press function key f0. As outlined in PROCkeys, this performs the following sequence of operations:

- Clears any previous input on the line.
- Sets mode 7 so that as much memory as possible is available to store the text (note that no checking is done for memory overflow).
- Sets LIST0 1 for a single space after each statement number.
- Intercepts OSWRCH so that characters will be written to memory instead of to the screen. Usually, the listing will be stored starting at the beginning of the next page after the tokenised Basic program. However, if the program is short then at least three pages must be allowed for *Wordwise*.
- Lists the program into memory (the listing does not appear on the screen).
- Restores the correct OSWRCH vector.
- Switches to *Wordwise* to initialise it (replying with N to the question "Old text?").
- Switches back to Basic.
- Calls the machine code routine to copy the listing to the *Wordwise* text area. The copying starts at the last character of the listing and works backwards to the beginning, stopping when a null character used as a flag is encountered.
- Switches back to *Wordwise* – this time replying that there is old text.
- Escapes into edit mode – at the top of the text.
- Since the word count has not been set, puts a marker at the end of the text, does a word count, then deletes the marker. A word count is hardly necessary for Basic programs, so this operation is optional, but it does cause entertaining contortions on the screen.

Once you have finished editing the program using *Wordwise*, hold down both CTRL and Shift and press function key f1 to get back to Basic. This must be done from within *Wordwise* edit mode, and performs the following sequence of operations:

- Sets the cursor to the top of text.
- Escapes to the *Wordwise* menu.
- Switches to Basic.
- Does an *FX225,1 command to allow the function keys to be used.
- Calls the machine code routine to intercept OSRDCH and feed the program text one character at a time to the Basic interpreter. Note that all blanks between a statement number and the first non-blank character of the statement are left out. (This means that you should put a single colon after a statement number if you want a null statement for program layout, or else the statement will be deleted.) If you keep holding down one of the CTRL and Shift keys and intermittently release the other, you can check for any errors given by Basic as it accepts and tokenises the text.
- When the machine code routine gets to the ASCII 129 character, used just before the *Wordwise* 'end' to make it red, the machine code restores the correct OSRDCH vector.



Using *Wordwise* to edit Basic programs can save you much time and trouble

Since the edited text is fed back to Basic as if it were being typed, you can edit in an automatic numbering command such as AUTO 100, followed by a sequence of statement lines without numbers, and the numbering will take place in the usual fashion. This should not be followed by any numbered statements, and you will have to press Escape to get out of the AUTO numbering after returning to Basic.

When editing the program remember that any lines which are more than 40 characters long will be broken at a word boundary and continued on the next line – this can be confusing and you have to be careful about where the ends of statement lines are.

Also, remember teletext mode has such oddities as both tabs and right square brackets appearing as right arrows on the screen. However, the ease of editing Basic programs with *Wordwise* more than compensates for such minor problems.

Neil Gordon's *Wordwise* listing is on yellow page 109

Entering the program

A checksum is included to help you spot any errors in your listing. If no mistakes are indicated, delete the checksum (lines 90–130) and save the program.

To speed up typing the listing in you may find it helpful to define the red function keys with commonly used assembler commands. Refer to the Sideways RAM Utilities listing on page 102 of the June issue of *Acorn User* for an example.

How the program works

Two routines are assembled in the memory starting at &C00. One converts a Basic program into text so that it may be edited using *Wordwise*; the other converts the *Wordwise* text back into a Basic program. The red function keys 0 and 1 are programmed to call these routines. Please note that this program will *not* work with *Wordwise Plus*.

The Basic-to-*Wordwise* conversion is performed by intercepting OSWRCH. When the program is listed the text generated is written into memory instead of being displayed on the screen. The *Wordwise*-to-Basic routine intercepts OSRDCH, sending the Basic text to the Basic interpreter.

Wordwise uses zero page locations &70 to &83. Two of these locations, &78 and &79, contain the text pointer and are named wwpointerL and wwpointerH respectively in PROCinit. The pointer to the text area when the Basic program is written out (wrpointerL, wrpointerH), and the pointer used when reading (rdpointerL, rdpointerH), are stored in the spare zero page memory from &84 onwards.

The assembly language is dealt with by PROCassemble (line 280 L). Lines 390 to 590 set aside three pages for *Wordwise* to use and decide the page at which the text should be written. The Basic-to-*Wordwise* conversion starts at line 600.

Lines 680 to 710 put a zero byte at the start of the listing. The main loop to transfer characters from the Basic text area to the *Wordwise* workspace starts at 730. The replacement OSWRCH routine (line 900 L); lines 1050 to 1080 copy the *Wordwise* cursor pointer. OSRDCH is intercepted at line 1110 and the new read-character routine starts at line 1160. Line 1200 checks for the teletext red character (used just before the *Wordwise* "end"), restoring OSRDCH (at line 1440) if it is found. Finally, the Y register is restored and the carry flag cleared before returning to Basic.

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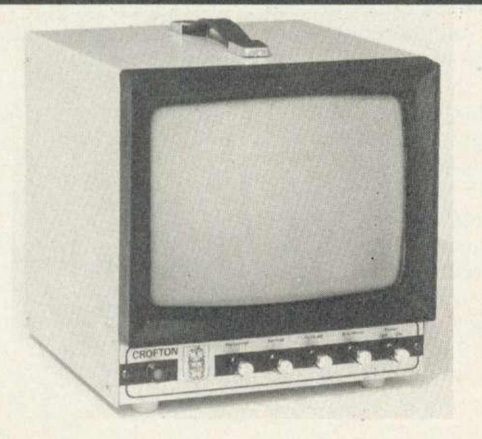
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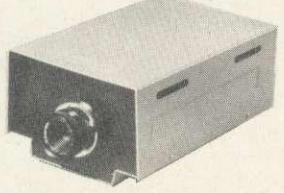
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COMMENTING ON VIEW

David Andrews introduces his *View*Suite utilities

INCLUDED in *View*'s edit commands is a very useful one called COmment. Although it's not described in the manuals, it allows text to be inserted at any point (for clarification) but it is ignored on PRINTing or SCREENing. This facility allows a full description of the text file to be accessed by the utility program on page 108.

This program provides a handful of useful routines to enhance the use of *View*: it shows (in mode 3) a catalogue of *View* files on any disc (0-3) if the first line of the text is a COmment. It prints out on screen the COmment line and the size of the file, thus avoiding the uncertainty of interpreting seven-letter filenames. It provides for the initial auto-loading of *View* with the chosen file (and printer/driver if fitted). It allows one-key SCREEN and SAVE (with safety interlock) of a chosen file within *View*. Finally, it provides a 'help' page accessible from the command page without corrupting your text.

What the *View* Suite needs:

- 40 or 80 track disc(s) with Acorn DFS, (not tested with other filing systems) or Electron ADFS
- *View* wordprocessor

Though the programs were developed on Basic 2, Acorn DFS version 0.98 and *View* A2.1, they are compatible with Basic 1.

How it works

There are five programs but two are not essential. The first, !BOOT, sets the drive (D%) to zero and chains "CAT". To enter it, type BUILD !BOOT, followed by D% = 0: CHAIN "CAT" and Escape. Enter *OPT4,3 and Return to EXEC the !BOOT file on Shift Break.

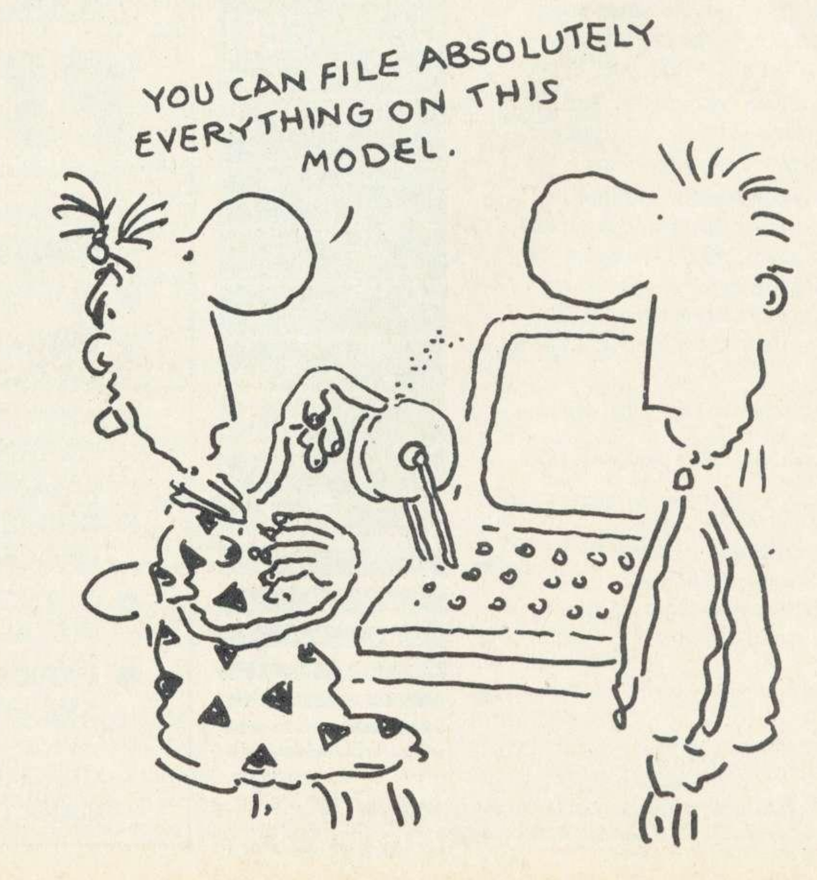
The second program is "CAT": it defines five function keys for use in *View*'s command mode (first page) – one with the name "dummy", which you can change later if a file is chosen from a catalogue. The function keys are defined as follows:

f0 HELP page
f1 SCREEN text
f2 SAVE and LOCK in S–A–F–E file
f3 Load printer/driver (if needed)
f10 (Break key) OLD
f11 (Copy key) UNLOCK existing S–A–F–E file and replace with current file.

These function keys only operate as above on the first page of *View*.

PROCintro displays a menu: option 1 is Catalogue, 2 is direct into *View* (via PROCview). If option 1 is chosen, the drive number (0-3) is asked. Pressing Return selects the current drive.

PROCmakecode and PROCdecode



assemble and store the names of all files (from all directories) in the array name$(Z%). Each file is opened for reading and checked to see if there's a COmment as the first line. If there is, the array is numbered sequentially (T%), and this number, directory, filename and COmment line (the first 63 characters or Return) are printed in PROCprint, plus the size of the file to the nearest kilobyte (EXT N%). Files with no COmment are ignored but are included in the total number and size of files for that disc side (size%). This information appears at the end of the list, together with the current drive and a prompt for the chosen file number (T%). If Return is entered then the menu page appears, otherwise *View* is called via PROCview.

If the chosen file is larger than 9.5k *View* appears in mode 7, otherwise in mode 3. Lines 840 and 850 effectively press keys f9 and f3, which have already been loaded with filename and printer/driver. (The driver, if used, only appears on drive 0 so f3 returns the original drive after loading the printer routine). Key f9 (load file) is cleared immediately after use, for safety. Key f0 *TYPEs the "help" file (described later). Key auto-repeat and delay are reset to values which make editing within *View* easier.

To return from *View* to menu, press CTRL/Break then Shift/Break. Drive 0 appears as the current drive (D% = 0).

Having accidentally overwritten files being worked on, I have tried to devise a safeguard. The current file in *View* can be SAVEd and LOCKed in a file called "S–A–F–E", using f2. If that file already exists then 'File locked' appears and the Copy key is enabled as f11 with *FX4,2 (for clarity, those instructions are supressed using *FX3,3). If you still want to save (replacing the existing S–A–F–E file) then Copy will UNLOCK, SAVE "S–A–F–E", reLOCK and disable itself. If you don't, then Escape will return to the text in *View* (disabling Copy). All *View* commands are retained at all times, so you can save and load manually when in command mode. If a S–A–F–E file exists, it is underlined in the catalogue.

The third program, "help", is a text file which is *TYPEd by f0 and screened while in the command mode of *View*. It lists the functions of the defined keys and summarises the stored commands with default values. Its use does not corrupt the text being edited, and since it is only stored on drive 0, the current drive is returned automatically after screening.

The suggested layout appears separately, and since *View* does not have a *SPOOL facility which enables *View*-prepared text to be read by any Beeb, the following procedure should be adopted: prepare a file in *View* (mode 3), bearing in mind that the second column of data should start at position 40 (otherwise it will make no sense at all in mode 7). Also, use spaces rather than TABs for alignment. SAVE (filename) then *SPOOL "help". SCREEN (filename) and then *SPOOL (no name). Enter NEW and READ "help". Most of the rubbish has now disappeared, but some still needs editing, before finally SAVEing "help".

The optional program called "dummy" is a *View* file set up with default ruler, page length, margins, footers, etc set up as you choose (like any printer/driver, this only appears on drive 0 and the key is then cleared).

The other optional item is any printer/driver machine code routine needed by *View*. This is addressed as "DAISY" in listing 1, but the name can be altered to suit. In addition to Acornsoft's own specific Printer Drivers and Printer Driver Generator, *Acorn User* has published two – in March 1984 (Tony Rudkin) and June 1985 (George Hill). Any of these routines can be called by CAT.

If the "dummy" file is not needed then shift the REM from line 180 to line 170. If your printer does not require a driver routine (relying on printer default) then delete lines 810 and 850. If "help" is to appear automatically every time *View* is entered, delete the REM from line 930.

Program notes

PROCoscli in Basic 1 equals OSCLI in Basic 2, and passes commands.
PROCintro provides the menu.
PROCmakecode assembles machine code to read disc catalogue information via PROCdecode.
PROCdecode Line 1200 allows for 'locked' files and line 1210 adds the directory before the filename contained in name$ (Z%).
PROCprint displays information on screen. The procedure is bypassed if no COmment exists as the first line. Even if the first line is a command or added ruler, for example, the file will not appear in the catalogue.

Disc Doctor SWAP format

To use the extra files available in *Disc Doctor*'s SWAP format, listing 2 on the yellow pages supplements the main program. Either add the lines to "CAT" or enter as a separate program and merge with "CAT" using the SPOOL/EXEC method, described on page 402 of the User Guide (or *MERGE in Beebugsoft's *Toolkit*).

1) !BOOT needs reBUILDing D% = 0:S% = 32:CHAIN "CAT"
2) The 'halves' of each disc side should be *TITLEd – starting with *A and *B. These are detected by line 385 (stored in S%) and allow the two halves to be SWAPped as an alternative to choosing a new drive (line 596).
3) Each half on Drive 0 needs at least !BOOT, "CAT" and "help". If "dummy" and "DAISY" are used they must also appear on each half.
4) If double drives are used then standard and SWAP formats can be mixed without problems – the SWAP routines are ignored when reading standard format discs.

```
===============================================================================
            Function keys             :        Stored commands and defaults
======================================|========================================
f0  "Help" page                       :  TM Top margin                        4
f1  SCREEN text                       :  PL Page length                      66
f2  SAVE S-A-F-E (COPY if "locked")   :  HE Header          1=on 0=off        1
f3  PRINTER daisy  (or default)       :  HM Header margin                     4
COPY UNLOCK S-A-F-E and overwrite     :  DH Define header   <64 chars   /-/-/-/
MENU - CTRL/BRK then SHIFT/BRK        :
======================================|
DM Define macro                          CE Centre text
EM End macro                             RJ Right justify
SR Set register                          LJ Left justify     (assumed)
                                         LM Left margin      (printing only)
PE Page eject
OP Eject - odd page                      FO Footer           1=on 0=off       1
EP Eject - even page                     DF Define footer               /-/-/-/
                                         FM Footer margin                     4
LS Line spacing          (default=0)     BM Bottom margin                     4
CO Comment
HT Highlight - change 128/129            TS Two-sided        1=on 0=off       0
===============================================================================
```

The 'help' page: its use does not corrupt the text being edited

See page 108 for the *View* Suite listings.

TAKING THE HINT

Pearls of wordprocessing wisdom on *Wordwise* and *View* from Patrick Quick and Bruce Smith

HERE are some hints and tips discovered (in some cases after much hair-tearing) while using *Wordwise* with Epson MX-80 and FX-80 printers, and other Epson compatible printers. Most of the comments apply to the RX-80 printer, and some are relevant if you use Epson printers with other wordprocessors.

Since I compiled these tips *Wordwise Plus* has been published, and many details are different with this upgrade (see Hints and Tips, page 40).

I have used '[' and ']' to represent the green and white embedded command markers for *Wordwise* and usually shown 'pad characters' as ¦.

Most problems are avoided if every text you produce starts off by initialising the printer ([OC27,64] for the Epsons). You cannot be certain which mode the printer is in after previous use nor where the print head is. By initialising the printer every time you can guarantee the formats you want.

Ensure that there is some printing, if only one space, before the first header of a paged document or the initialisation will occur after the header is printed, eg, [OC27,64]¦[EP[DH]etc.

With *Wordwise Plus* you cannot perform *any* action before printing the header on the first page (see below) so you cannot initialise in this instance. Also you must only initialise in the first file when doing multi-file print-outs or some text will be lost.

If you program the red function keys, your functions are available while using *Wordwise*. To access them use CTRL/Shift/function key (ie, hold down CTRL and Shift while pressing the appropriate function key). I use my function keys for the most useful Epson controls, eg, CTRL/Shift/f_0 produces [OC27,45,1] for underline on. My choice of functions is:

f_0 underline on	[OC27,45,1]
f_1 underline off	[OC27,45,0]
f_2 emphasised on	[OC27,69]
f_3 emphasised off	[OC27,70]
f_4 'title' on	[OC27,69,27,87,1, 27,71,27,45,1]
f_5 'title' off	[OC27,70,27,87,0, 27,72,27,45,0]
f_6 superscript on	[OC27,83,0]
f_7 superscript off	[OC27,84,0]
f_8 subscript on	[OC27,83,1]
f_9 subscript off	[OC27,84,1]

(By 'title' I mean emphasised, underlined, enlarged, double-print!)

To include the embedded command codes in the key definition you use ¦!! and ¦!'' for 'green' and 'white' respectively. I program the keys with a little loader program BOOTed from disc which says, for example, 10 *KEY0¦!!0C27,45,1¦!''

The loader program also allows through the line-feeds which my printer needs (*FX6).

Lastly it calls up *Wordwise* using the full name (*WORDWISE) as the abbreviation *W. may be misunderstood by other ROMs.

The programmable keys may be used for other standard jobs, eg, the [TI0] before a title and the TAB after (see indent section of this article) can be inserted after normal entry by a key programmed as:

*KEY0¦!!TI0¦!''¦!$¦I¦A

which says [TI0] then 'cursor to character', 'space', TAB (CTRL/I), 'delete character' (CTRL/A).

A line that starts:

1. First thingy. . .

can be converted to

[ti0]1. <TAB> First thingy. . .

by moving the cursor to the start of the line and pressing CTRL/Shift/f_0. This can be achieved in *Wordwise Plus* with a segment program instead.

The functions of all the *Wordwise* function keys can be programmed into your keys by ¦! followed by 'space' for f_0 or followed by the appropriate number key Shifted for the others.

With *Wordwise Plus* these functions are available from the main menu. Accidentally pressing a function key can cause problems.

Be careful with spaces in embedded commands. Once an unexpected character is found in an embedded command, *Wordwise* will ignore the rest of the command. *Wordwise Plus* is different and will skip spaces within a

command and gives error messages for other illegal characters. For example [LL 40] will be seen as just [LL] by *Wordwise* and the line length will be set to the default 70 columns rather than the 40 columns you wanted. *Wordwise Plus* will set it correctly to 40 columns. [LL80] will not be seen at all by either *Wordwise* or *Wordwise Plus*.

You can use this short-sightedness of *Wordwise* to your advantage. You can put any message you like in an embedded command which starts with a space and it will be ignored, or use it for an explanatory comment which will not be printed – this is particularly useful for special printer codes, eg:

[OC27,64][¦initialise¦printer]

or

[OC27,112,1][¦proportional¦spacing¦—¦FX80¦only!]

Long sequences of OCs can fail if they are split over two lines on the screen. Where the screen line break occurs a 'false' carriage return is stored (CHR$&8D). *Wordwise* sees this as the end of the OC and the last few codes may not be sent. *Wordwise Plus* sees this as an error and refuses to print any further.

For both *Wordwise* and *Wordwise Plus* you must move the cursor to the very top of the document before printing. For *Wordwise Plus* you must also turn off screen formatting with CTRL/F.

Wordwise formats the layout on the 40 column screen. If you have a line which naturally consists of 40 characters or 39 characters and a space, then the formatting can confuse you. It can be difficult to see exactly what you are editing and whether there is a carriage return there or not.

For *Wordwise*, insert an extra space or two in the middle of the line to force an overflow. Do not forget to remove the extra spaces afterwards. For *Wordwise Plus* you can use CTRL/F to turn on or off the on-screen formatting.

You may want to *SPOOL a document for later printing (option 8 on the *Wordwise* menu). If your document contains any printer function codes ([OC. . .]) they will *not* be written to the spool-file and so will not have any effect when you do eventually print the document. They *do* get through to the spool file correctly with *Wordwise Plus*.

You need to set up paging carefully with either *Wordwise* or *Wordwise Plus*. There are several common problems which occur: you may get no header on page one; the first line of the text may print before the header on page one (*Wordwise* only), or the header on page one may not be printed in the special mode (eg, emphasised print or underlined) you have selected for the whole document.

To solve these three problems for both *Wordwise* and *Wordwise Plus* use the following rules at the beginning of your document:

1. Set up any special conditions (eg JO) first, but *without* ending the embedded commands with] or else the carriage return at the end of the line will be printed.
2. Enable paging and define the header in one go.
3. Define your footer after EP.
4. Both header and footer definitions end at carriage returns. Often the end of the header or footer is a page number ([PP]) or some other embedded command in green. Make sure this command has the white text marker after it or the carriage return at the end of the line does not count and you may find the next piece of text included in the header or footer.
5. Have *no* printing occuring before the EP/DH line.
6. Put any special printer formats (eg, OC27,69 for emphasised print) required for the whole document in the DH line so they are set up when the first header is printed, eg:

```
[JO
[LS2
[EP[DH[OC27,69[CE]¦[OC27,45,1]
Wordwise & Epson tips[OC27,45,0]
[DF[CE]page [PP]
First line of main text.....
```

To force a footer on the last page of a printout end the document with a [BP] (break page). To stop the next header printing use [EM] (enable messages) just before the [BP]. When the printing halts with a PAPER! message, press Escape to avoid the next header, ie, end your document with [EM][BP].

If a section of text is in a special print mode (underlined, italic, condensed, emphasised, etc) you might find that a page break comes in the middle of it. If so the header will be printed in the special mode.

The answer is to make any large, specially formatted piece of text stay together by putting a [CP] (conditional page break) in front of it. This is a pretty good idea anyway to keep paragraphs together. This paragraph is about four lines long and so has a [CP6] at the beginning.

For a smaller piece of text, eg two words underlined, using pad characters between the words will ensure that the phrase is never split over two lines.

Underlining a centre ([CE]) title with *Wordwise* and an Epson MX-80 printer is no problem, eg:

[CE][OC27,45,1]Hints & Tips[OC27,45,0]

produces:

<u>Hints & Tips</u>

With an FX-80, however, the same example prints as:

Hints & Tips

I don't know why this happens but I have found a cure. Include a space or pad before the 'underline on' command like this:

[CE][OC27,45,1]Hints & Tips[OC27,45,0]

This problem also occurs if an underlined phrase is split over two lines and the second line begins with spaces (ie, an indent [IN], or left margin [LM] has been defined). The MX-80 and FX-80 approach the underlining of leading spaces differently. I think the MX-80's approach is actually more sensible . . . so much for progress!

The answer in these situations is to use 'pad' characters (usually '¦') between the words of the phrase rather than spaces. This will ensure that the phrase is not split if at all possible. If the phrase is long then this may cause a mess with the layout. A second technique is to underline each word individually – this solves the problems but is more trouble and does not look so neat, eg:

[OC27,45,1]two words[OC27,45,0]

or [OC27,45,1]two[OC27,45,0]
[OC27,45,1]words[OC27,45,0]

Very often you want to print a list of numbered items. The text of the items is set in a little way but the numbers stay out at the left-hand edge. The way to achieve this is to set an indent of about five spaces ([IN5]) but to stop the indent for the numbers by using a 'temporary indent' of zero ([TI0]).

You will, of course, want the rest of the text on the same line as the number to be indented so follow the number with a TAB (looks like a right arrow), having defined a tab-stop at column 6 ([DT6]). Note that the tab-stop is one more than the indent figure. (*Wordwise Plus* TABs differently and you must use the same DT as IN ie, [IN5][DT5] in this example.)

The final thing looks like this:

[IN5][DT6]

[TI0]23.—>Rhubarb, rhubarb, rhubarb, rhubarb, rhubarb, rhubarb, rhubarb, rhubarb, rhubarb . . . .

and prints like this:

23. Rhubarb, rhubarb, rhubarb, rhubarb, rhubarb, rhubarb, rhubarb, rhubarb, rhubarb . . . .

You'll find more help on the wordprocessing front in Hints and Tips on page 40. Plus there's a feature for *Wordwise* fans on page 137 and one for *View* users on page 141

AND NOW FOR VIEW . . .

View/Boot

Disc users can create a simple but effective !BOOT file (called by Shift-Break) for *View* using *BUILD. A description of use of the *BUILD file can be found in the *Disc Users Guide*. Put a disc in the drive and type in:

*BUILD!BOOT

The disc drive will come to life and print a line number onto the screen, ie: 0001 or 1 depending on your DFS.

Now enter each line pressing Return at the end.

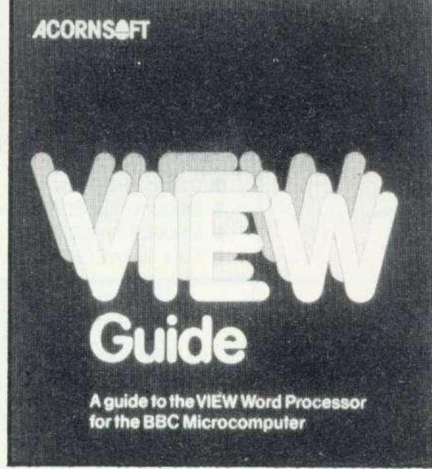
```
*BASIC
*FX 6,4
*TV 255,1
*WORD
MODE 3
NEW
PRINTER FX80
```

When line number 8 is printed (the one after PRINTER FX80) press Escape. Then type:

*OPT 4,3

This writes to the disc in such a way that it will allow you to 'boot' the file using Shift-Break – again look in the *Disc User Guide* for full details.

*FX6,4 generates line feeds on the printer; *TV255,1 moves the top of the screen display down slightly; PRINTER loads in a printer driver program previously customised with a printer driver generator (see George Hill's article in the June issue), saved on disc under the filename FX80 in this case.



View: how to put the Boot into disc

You can examine your !BOOT file at any time by typing:

*TYPE ! BOOT

A better way to enter !BOOT files is to use *View* itself. Simply enter the file as above, pressing Return at the end of each line. The save the file using:

SAVE !BOOT

Constructing !BOOT files in this way means that you can load them back into *View* for easy editing.

Key	code	key code
f0	140	¦!¦L
f1	141	¦!¦M
f2	142	¦!¦N
f3	143	¦!¦O
f4	144	¦!¦P
f5	145	¦!¦Q
f6	146	¦!¦R
f7	147	¦!¦S
f8	148	¦!¦T
f9	149	¦!¦U
SHIFT		
f0	156	¦!¦\
f1	157	¦!¦}
f2	158	¦!¦^
f3	159	¦!¦–
f4	160	¦!¦(space)
f5	161	¦!!
f6	162	¦!"
f7	163	¦!£
f8	164	¦!$
f9	165	¦!%
CTRL		
f0	172	¦!,
f1	173	¦!–
f2	174	¦!.
f3	175	¦!/
f4	176	¦!0
f5	177	¦!1
f6	178	¦!2
f7	179	¦!3

Table 1. Function key control codes

The Key to Success

Complex command strings can be built into *View*'s function keys by writing the appropriate function key codes into them (table 1).

Before defining the keys enter *FX228,1. For example, to create a key that will delete the bottom line of text and then move to the top, you need to use the key codes for f2 (top of text), f7 (delete line) and f1 (top of text) thus:

*KEY0 ¦!¦N¦!¦S¦!¦M

Use this in Edit mode by pressing Ctrl-Shift-f0 together.

The *FX228,1 command and the function key definitions could, of course, be part of your !BOOT file.

Number registers

View has 26 registers for storing numbers, labelled A to Z. Only two of these are allocated: P for pages and L for lines.

To access these registers (from machine code for example), they are kept in memory from &798 to 7CB. Each register is allocated two consecutive bytes, ie, A is stored in &798 (low byte) and &799 (high byte), and so on.

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```
R0001.1243.2000          00:14:27
Main Menu                DDD-Base
Key: A                    Sort: A
Esc. Browse File
A.   Add Records
B.   Field Transfer
C.   Close File
D.   Delete Records
E.   Edit Record
F.   Find Records
G.   Default Values
H.   Force Calculations
I.   Optimise File
J.   User Variables
K.   Search by Key
L.   Change Level
M.   Field Summary
N.   New Database/Reformat
O.   Order File
P.   Print Records
Y.   DDD-Calc
Z.   DDD-Plot
*.   Command Line
Enter option
```

```
Row  09   R0001.1243.2000   00:15:25
Col  17       Sort  0%      Formula
Fld            Browse       Calc OFF

A.J. Simmons & Co. Ltd.
   Employee records - Confidential

Name: David Simmons

Employee No.: W543 Seniority: 3-11

National Insurance No.: YW 02 03 20D

Next of Kin: Mother
   Telephone: 0327-54362    Sex: M

Date of Birth: 10/03/1952

          Home Address: 15 Causewell
                              Blakely
                              Norwich
                              NR4 5F
Department: Cutting

Remuneration details follow:
 Goto which record: +smith
```

```
R0001.1243.2000          00:14:23
Find Records             DDD-Base
Key: A                    Sort: A

A Name              N Address line 4
B Employee No.      O Department
C Seniority         P Hourly Rate
D NHI number        Q Overtime Rate 1
E Next of Kin       R Overtime Rate 2
F Telephone         S Overtime Rate 3
G Sex (M/F)         T Payment Method
H DOB - Day         U Holiday Status
I DOB - Month       V Back Pay
J DOB - Year        W Attitude
K Address line 1    X Timekeeping
L Address line 2    Y Reference
M Address line 3    Z Other

    Enter search definition

A="#Smith"ANDP>3.56
```

I N T E G R A T E D

```
C0018    R0001.0020.2000   00:18:08
           DDD-Calc
  A:      B:       C:       D:
0001
0002 Any Company Limited
0003 Schedule of purchase invoices
0004 outstanding as at 12/5/1985
0005 -----------------------------
0006 Goods for resale
0007 ============================
0008 Detail  Inv No  £ Gross   VAT
0009 -----------------------------
0010 HBF0709 2300      23.56   3.07
0011 HBG6454 V568    1256.54 163.90
0012 HBF7543 H101     343.67  44.83
0013 HBG6335 G2557     99.95  13.04
0014 HBF6443 J644      34.59   4.51
0015 HBG4210 193      129.95  16.95
0016 HBF7449 H2177   2355.88 307.29
0017 -----------------------------
0018 Cd/Fwd Balances>4244.14+ 553.59
0019
0020 Aged analysis to Cash Flow -
  S(C10:C16)
```

```
C0018    R0001.0020.2000   00:18:13
           DDD-Calc
  A:      B:       C:       D:
0001
0002 An  TAB. Cursor Control
0003 Sc  A.   Column Transfer   es
0004 ou  B.   Blank Cells
0005 --  C.   Close File
0006 Go  D.   Delete Rows
0007 ==  F.   Format Cell
0008 De  G.   Goto Cell          VAT
0009 --  I.   Insert Rows
0010 HB  J.   User Variables    3.07
0011 HB  P.   Printout          3.90
0012 HB  R.   Replicate         4.83
0013 HB  T.   Change Title      3.04
0014 HB  U.   Update Page       4.51
0015 HB  V.   Update File       6.95
0016 HB  W.   Column Widths     7.29
0017     X.   DDD-Base
0018 Cd  Z.   DDD-Plot          3.59
0019     *.   Command Line
0020 Aged analysis to Cash Flow -
  Select option
```

```
A0001    R0001.0020.0085   00:28:10
           DDD-Calc
  A:      B:       C:       D:

!0=.15
!1=ABS((A-B)/2)+S(A1:A546)
!2=TAN(45)+LOG(ATN(164))
!3=FNmax(B12:B200)
!4=FNmin(B12:B200)
!5=A!DIV2*100
!6=-6000*(A2>12)-8000*(A2<13)
!7=
!8=
!9=

!H=DDD-Calc
!P=39
!T=Time
!V=Values

 Edit which:
```

```
Pie Chart of V           Test Graph Data
ACME MARKETING           A Jan   10%
CHELMSFORD               B Feb    5%
                         C Mar    8%
                         D Apr    7%
                         E May   17%
                         F Jun    2%
                         G Jul    9%
                         H Aug    7%
                         I Sep   14%
                         J Oct    6%
                         K Nov    9%
                         L Dec    6%
RELEASE OF BRAND
JIM -
NOTE INCREASE IN
REVENUE AFTER LAUNCH
OF NEW PRODUCTS
Total 42633
```

```
Histogram of V
TO SALES DIRECTOR FROM MANAGING DIRECTOR
NOTE THE POOR PERFORMANCE OF PRODUCT X
FOR SUMMER MONTHS AND JANUARY
PLEASE LET ME
HAVE YOUR
COMMENTS
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
av=1145.41667 sd=3243.25571
```

```
Y=3.51694818*X+288.297594
LINE OF BEST FIT
APPLIED VOLTAGE
Correlation  0.982869559
```

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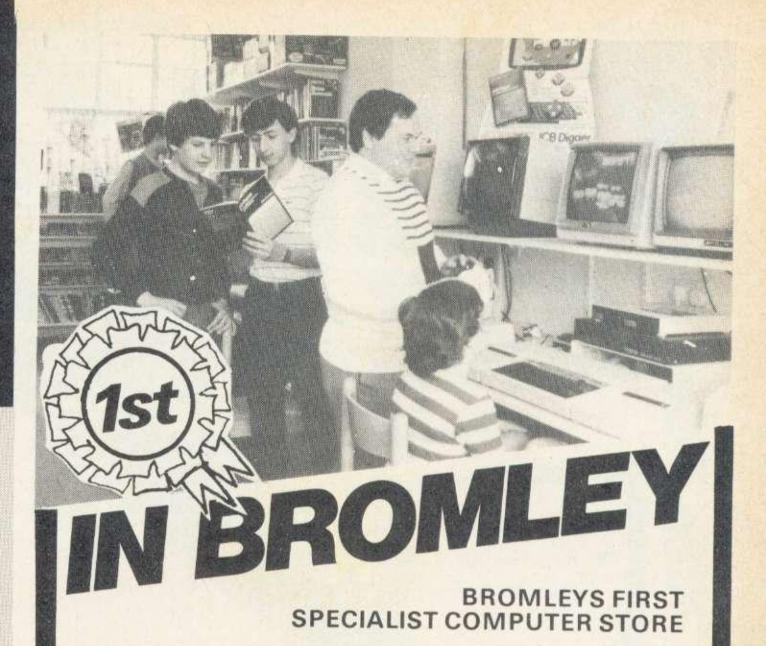
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GAMES TOP 20

	TITLE	PUBLISHER	PRICE	MICRO	REVIEWED
1 (7)	Revs	Acornsoft	£14.95	B	July '85
2 (1)	Knightlore	Ultimate	£9.95	B	
3 (2)	Alien 8	Ultimate	£9.95	B	
4 (3)	Atic Atac	Ultimate	£7.95	B	
5 (5)	Elite	Acornsoft	£14.95 (£17.95)	B/E	October '84
6 (8)	Combat Lynx	Durell	£8.95	B/E	September '85
7 (4)	Wizardore	Imagine	£7.95	B	August '85
8 (9)	Brian Jacks Superstar	Durell	£7.95	B/E	August '85
9 (6)	Magic Mushrooms	Acornsoft	£12.95 (£14.95)	B/E	May '85
10 (13)	Football Manager	Addictive	£7.95	B/E	March '85
11 (-)	Repton	Superior	£9.95 (£11.95)	B/E	August '85
12 (10)	Gremlins	Adventure Intl	£7.95	B/E	
13 (15)	Pole Position	Atarisoft	£9.99	B	February '85
14 (20)	Hunchback	Ocean	£6.90	B/E	December '84
15 (re)	Emerald Isle	Level 9	£6.95	B	June '85
16 (17)	Hampstead	Melbourne House	£6.95	B/E	
17 (11)	Castle Quest	Micro Power	£12.95 (£14.95)	B	March '85
18 (18)	Tales of Arabian Knights	Interceptor	£6	B	
19 (12)	Tempest	Superior	£9.95 (£11.95)	B/E	
20 (14)	Blockbusters	Macsen	£7.95	B/E	

B = BBC. E = Electron. re = Re-entry. Prices in brackets are for disc versions. Compiled by RAM/Computer.

EDUCATION TOP 10

1 (7)	Best Four – Maths	ASK	£19.95	B/E
2 (3)	Pan 'O' Level (series)	Hill McGibbon	£14.95 (£19.95)	B/E
3 (5)	Best Four – Language	ASK	£19.95	B/E
4 (1)	Music System	Island Logic	(£29.95)	B
5 (2)	Mr T (series)	Ebury	£9.95	B/E
6 (8)	Words Words Words	ASK	£9.95 (£11.50)	B/E
7 (–)	German Master	Kosmos	£8.95	B
8 (6)	First Steps with Mr Men	Mirrorsoft	£8.95 (£11.95)	B/E
9 (9)	Podd	ASK	£9.95 (£11.50)	B/E
10 (4)	Mathskill 1 and 2	Griffin	£11.95	B

Compiled by RAM/Computer with the assistance of Proteus Distribution.

BUSINESS TOP 10

TITLE · PUBLISHER · PRICE

	TITLE	PUBLISHER	Cassette	Disc	ROM	Electron	Shadow on B+	6502
1 (1)	Mini Office	Database	£5.95	£7.95/£9.95†	—	£5.95	*	*
2 (2)	Wordwise Plus	Computer Concepts	—	—	£56.35	—	—	—
3 (3)	View	Acornsoft	—	—	£59.80	—	—	—
4 (5)	Wordwise	Computer Concepts	—	—	£46	—	—	—
5 (4)	Database	Acornsoft	£11.90	£15.35	—	—	—	—
6 (9)	Viewsheet	Acornsoft	—	—	£59.50	—	—	—
7 (7)	Masterfile 2	Beebugsoft	—	£19	—	—	Yes	Yes
8 (8)	Printmaster	Computer Concepts	—	—	£33.35	—	*	(Yes)*
9 (10)	Discmaster	Beebugsoft	—	£19	—	—	Yes	Yes
10 (6)	Integrated Accounting Suite (5 in series)	Gemini	—	£99.95 each	—	—	*	—

Compiled by RAM/Computer from a panel of specialist dealers

*Contact publisher: Database, 061-480 0171; Computer Concepts (0442) 63933; Acornsoft (0223) 214411; Gemini (0395) 265165; Beebugsoft (0494) 815228

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University Software

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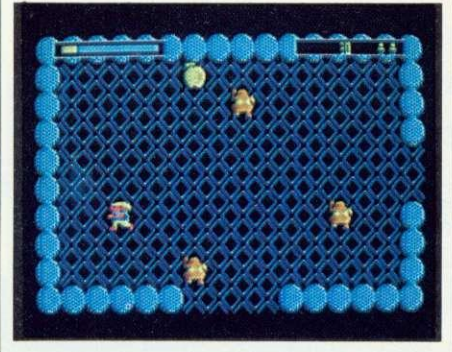
Energy crisis

'Labyrinth', Acornsoft, BBC B, £9.95, (£11.50 disc)

LABYRINTH is one of a recent batch of releases from Acornsoft and is their first game in the current style in which you have to guide a man around a series of rooms collecting objects as you go. However, it goes about this in its own original way.

You see your man, Mork, from above as you guide him around the series of seven interconnecting mazes that make up the labyrinth. A crystal is hidden in each maze and this will remove the force-field that bars your way to the next one.

While searching for each crystal you encounter a large range of aliens who do their best to stop you getting to it;



and their best gets better the further into the labyrinth you go!

The object is to find what the instructions call 'the extraordinary seventh crystal', though as I haven't found it I can't tell you what makes it so special!

To help you reach your goal you can shoot the aliens with bullets that do less damage the lower your energy level, or, for double points, you can squash them with a rock. This is found in the first room of the labyrinth and you must push it around for the rest of the game. There is only the one rock and it's not a good idea to leave it behind!

To replenish your flagging energy (you die if it runs out) you can eat the fruits that lie around the maze. These are depicted in spectacular mode 1 graphics, as are the monsters and the different walls of each of the seven mazes. In fact, the game uses a specially defined small-screen version of mode 1 to leave more memory for the program, and because of the clever use of shading you would never believe there are only four colours on screen at once. The sound effects are also good.

In summary, there are a few small niggles – for example, the very small numbers that are used for the score. However, the game has lots of nice touches (such as scrolling between rooms) and it is generally well-programmed, colourful and worth checking out. **Michael Beaton**

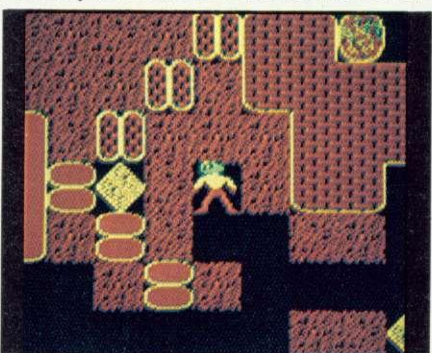
A gem of a challenge

'Repton', Superior Software, BBC B and Electron, £9.95 (disc £11.95)

IF you can imagine what Harry Sinclair looks like after about ten gallons of best bitter then you have a pretty good idea of what the hero of this brilliant new game looks like. And I mean brilliant – for my money the best arcade game for the Beeb and Electron yet!

Colour, sound, super scrolling graphics, some excellent humour and a good challenge just about sum this one up. There are a set of diamonds scattered around a series of underground caves, and you have to collect them by weaving your way through the tunnels. No problem – until a rock hits you on the head taking that cocky smile off your face and you to the undertakers! Some of the diamonds have been craftily placed in cleverly constructed traps, so you need to think before you tackle any diamond with a rock near it.

With about ten minutes practice you can get on to the second of the 12 screens and that is a different prospect. Not only have the number of diamonds



increased, but so have the number of rocks. Oh, and then there are the eggs. Eggs? Yes eggs, perched right on top of the occasional diamond. Drop one of these on the floor and the thing hatches. Not a friendly little lion though, but a reptile that pursues you all over the screen.

Well that's about as far as I've got – but I'll get onto the third screen soon, then there will be only nine more to go!

Of course, our little hero has a mind of his own. Leave him alone for a minute while you replenish the coffee cup and there he is looking left and right waiting for something to happen.

As you reach the second screen (and I'm told all the others) you're given a password. You can use this at the start of a game to allow you to move directly to the screen you are trying to solve – nice one, lads! A map of the underground caverns is available at any time at the press of a key – though I don't find it very easy to see just where I am.

As is the norm these days, there's £100 awaiting the first person to complete screen 12 – get the cheque ready lads, I'm getting there! **Bruce Smith**

Swinging in the drain

'Drain Mania', Icon Software, 65 High Street, Gosforth, Tyne and Wear, BBC B and Electron, £7.95

DRAIN MANIA is the latest offering from Icon Software, which is proving to be a supplier of good arcade games.

This one is a platform game with a difference, and is most suited to Status



Quo fans who are fond of sewers.

The game starts with a scrolling instruction screen that looks pretty but is harder to read than a stationary one. Accompanying this is some very good Baroque-ish three-part music.

The main game involves moving a brightly coloured little fellow with a flat head (aren't they all?) around the platforms. The surface of each platform is meant to be slippery, so you have to take account of your braking distance when trying to turn and run the other way.

You can jump for rotating coins which hang from the platform above your head, but the main aim is to dislodge the monsters that appear from drains at the top of each screen and make their way down to similar outlets at the bottom. If you can head-bang the platform directly beneath their feet they will fall over. You can then destroy them by running over or jumping on them. If you touch them while they're upright, however, you lose a life.

Playing *Drain Mania* is a bit like playing an inverted version of *Monsters* but much more enjoyable. It's easy to play but hard enough to be addictive.

Simon Williams

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Back to base one

'Combat Lynx', Durell Software. Tel: (0823) 54489. BBC B and Electron, £8.95

ACCORDING to the instructions, this game can be played either as a shoot-em-up arcade game or as a strategy game. Your job is to fly a Lynx helicopter, which is kept extremely busy ferrying men between the four bases under your control. These are the wounded from bases two, three and four who have to be taken back to base one for 'rejuvenation' and then returned to the base you feel to be under greatest threat from the enemy. As well as providing air cover for your troops, the Lynx is used to deploy mines which will blow up the tanks threatening your bases.

Although the graphics scroll very smoothly, in general they were a disappointment. The view of the countryside does not change perspective as you gain height and this made it flat and uninteresting. Also the viewing screen is less than one third of the total screen – the rest is taken up with gauges and displays.



I found the controls very complex. Also there is no change keys option, although you can use some joysticks.

However, flying is simple compared to firing the weapons. The Lynx has a variety of ways of zapping the opposition – rockets, machine guns, cannon, anti-tank missiles, anti-aircraft missiles and mines. The easiest to use are the anti-aircraft missiles which don't need aiming, you just fire and hope that the heat-seeking mechanism works – mostly it does.

The view of the battle zone is from the rear of the helicopter, unless you are flying east or west, when you see the Lynx from the side. The change is sudden and, unless you are watching the compass, completely unexpected. With so many games now giving a realistic view of the action I found this disappointing.

Another badly designed feature is the 'ticker tape' display of the north and east co-ordinate positions of the other bases. This is shown as 'Base No 1 is at co-ordinates 5004N 4993E' which takes 11 seconds to read on a five-character display – there just isn't time to read this with so much else going on.

Also available is a map of the battlefield, which uses block graphics to display your bases, ground heights, houses, enemy vehicles, etc, which is not very useful.

Generally a disappointment – although the idea is good the execution is too complex to make it a fully satisfying game.

Bill Margetts

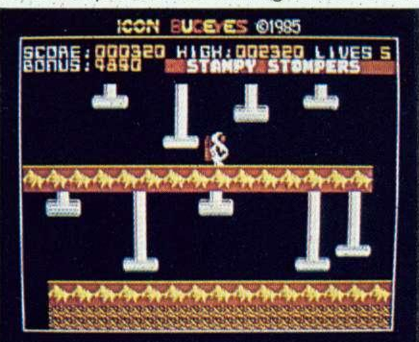
Race to the reactor room

'Bug Eyes', Icon Software, 65 High Street, Gosforth, Tyne and Wear. BBC B and Electron, £7.95

BUG EYES is a platform game with no pretentions to 'arcade adventure'. The whole thing is in mode 1, which allows for well-detailed sprites, but only in four colours. The idea is that you steer Starman, a nicely drawn astronaut, through the various levels of an alien asteroid that the aliens are aiming at Earth. If you can reach the reactor room in time. . . .well, Flash Gordon look out!

The playing screens are only about two-thirds full size, presumably to get as many as possible in the model B's memory, but you don't really notice.

Your only controls are left and right – none of this jumping rubbish here – and it's all a question of timing to avoid the assorted meanies that bounce up and down or flash on and off. This may sound rather dull particularly as there are a lot of platform games around with more to amuse you. Indeed, the game is more cute than treacherous, although none the easier for its cuteness.



The first screen, 'Stampy Stompers', has a number of pistons plonking down in your path. Not too difficult to avoid, but in places you need to wait for two or more pistons to line up before you risk your neck beneath them.

Screen two, 'Turbo's Mini', involves disappearing bridges and first sight of the 'Bug Eyes'. As you might expect, things get more complicated further on.

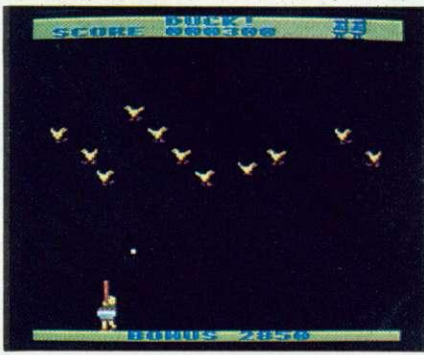
There are 10 screens before your final onslaught on the reactor. Sound is fairly standard, but quite entertaining.

This one's a maybe. It's quite fun, but there are more entertaining games to spend £8 on.

Simon Williams

Driving you quackers

Duck!, Firebird Software. BBC B, £2.50



A FAIRLY simple shoot-'em-down game by Melvyn Wright, who has enlivened the loading process with some rather jolly music – while the title screen explains the few playing instructions and the rest of the program chains itself, you are entertained by a bouncy little Viennese waltz.

Then you're off (via a few bars of *The Ugly Duckling*) into the first screen, sliding Farmer Tubby left and right and blasting off with his shotgun at some ducks with yellow feathers and red wellies mooching across the top of the screen. They're not difficult to hit, but watch out when you pot one – it's liable to land on you and kill you.

Screen two offers more of the same, with different background colours, only this time the ducks contrive to lay eggs while walking (the first of several ornithological oddities). Shoot the eggs if you can, for bonus points, but if you miss, don't tread on one – it's fatal.

If it's left alone, it will incubate within seconds and out will hatch a full-grown duck who starts flying up and down. Well, it's not so much flying as bouncing on a slow-motion trampoline, and is harder to hit and very likely to land on you and flatten you.

That's about all there is to it. Further screens simply introduce more ducks with an urge to breed even faster.

The graphics are fairly primitive and the zaps, pows and splats (why no quacks?) are less than classic. But if you're easily pleased by games which don't involve anything more than left, right and fire, *Duck!* should keep you entertained.

Jeff Pike

EXPANDING IN THE RIGHT DIRECTION

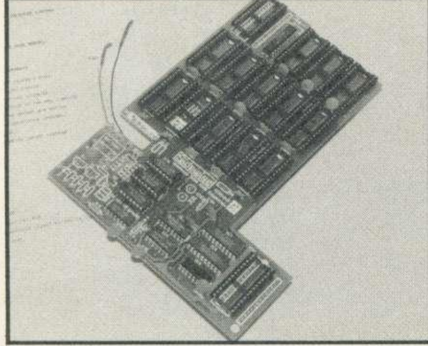
Chris Drage compares six ROM expansion boards

THE criteria for choosing an expansion board were highlighted in my article in the April 1985 issue, and new readers may find the comments there useful.

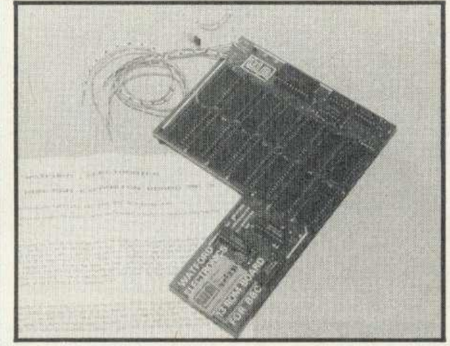
As most ROM expansion boards are quite reliable choosing one is a case of deciding what facilities you want and estimating those you might need in the future – this may save you a considerable sum, as some ROM boards are designed to accommodate other systems, eg, the Romram-15 and Exprom boards reviewed in April. Other boards quite definitely do not. The ROM boards currently on the market aim to give the user the maximum amount of flexibility in their configurations – this may be important if you want to develop your own 'sideways' firmware. The inclusion of RAM sockets on the boards will be an important consideration now CMOS Ram chips are falling in price.

ATPL Sidewise Board

The Sidewise Board from Advanced Technology Products is a strong and well-designed internally mounted board supporting a total of 16 ROMs, 12 of which are on board, the other four remain in the Beeb. It may also be fitted with 16k of sideways RAM as two 8k 6264 CMOS chips. In this configuration a total of 15 ROMs are available, the sideways RAM taking the position of socket 15 (15a and 15b to be exact). Provision is made to fit a rechargeable battery to the board.


ATPL Sidewise Board

Installation is quite straightforward, with Sidewise occupying the OS1.2 socket (IC52) and the A/D socket (IC73). Placing it correctly into the vacated sockets is rather tricky and another problem encountered concerns a pair of power leads to the main board, which must be bent flat to accommodate the Sidewise. However, care is rewarded with a very stable and well-balanced board. The two ICs are replaced at corresponding positions on the board, then you just connect two flying leads to link S21 on the BBC micro board.


Watford Electronics Mk2 ROM Board

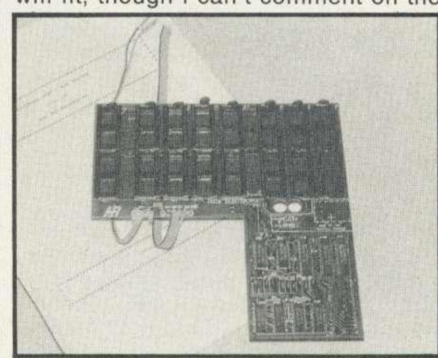
The board is properly buffered and ROM insertion and removal is quite simple. For anyone wanting a simple extension of the sideways ROM/RAM in their computer then I can recommend the Sidewise board. However, if an Aries B-20 video memory board is required at the same time then you should look at other boards.

Watford Mk2 ROM Board

The Watford Electronics Mk2 ROM expansion board is an improvement on the Mk1 version. The PCB is now stronger, is properly buffered, and doesn't crash alarmingly. The Mk2 carries 13 sockets, enabling a total of 16 ROMs to be fitted. It may also be configured to accept one or two CMOS RAM chips in sockets 15a and/or 15b. Thus 2, 4, 8 or 16k options are possible by soldering various links. However, sensible default link settings are available. Like the Sidewise board, 16k of RAM will allow a total of 15 ROMs to be used. It can add battery backup as an extra.

Installation is far from straightforward as Watford Electronics has not improved the header plug which still has oversized, square pins guaranteed to enlarge your Beeb's ROM socket, and two of the legs on the review board were 1mm shorter than the others! The A4 instruction sheet states that the board will buckle slightly but 'not to worry'. To fit this board you must be prepared to do some very fine soldering. Five wires must be soldered to the legs of chips, then a flying lead plugs into link S21. Fitting this board is not for the inexperienced.

The board is fitted with supports to bear the stress when inserting or removing ROMs. In situ it straddles the BBC micro's RAM and video areas, which could lead to overheating in some machines. An Aries B-20 board will not physically fit into the micro with a Watford Electronics board in place. Watford's own 32k expansion board will fit, though I can't comment on the performance of this configuration.


HCR Internal ROM Expansion Board

My overall view of the board is not one of confidence nor admiration. It appears to have been designed and produced in a rush with little thought given to the needs of users.

HCR Internal ROM Board

Somewhat similar in shape and design is the ROM expansion board from HCR Electronic Services. In common with the previous boards, the aim is to expand the computer's ROM capacity to a maximum of 16. All these reside on the HCR Board in an 8 × 2 matrix. Two pairs of sockets may be configured to take two 8k ROMs to simulate one 16k ROM. Up to 16k of CMOS RAM may be fitted using either 2k devices (6116) or 8k devices (6264), but the former option limits the number of ROM sockets to eight. The five possible configurations of ROMs and RAMs are achieved by selecting the correct links. The board is

fully buffered and you can fit a rechargeable battery for RAM backup.

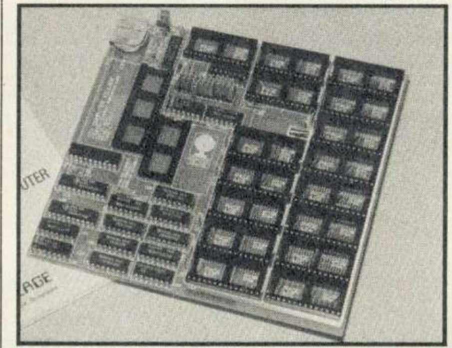
Installation involves the use of a soldering iron as six wires must be attached – four soldered to the legs of IC76, one to be gripped by the jumper on link S21 and a single read/write lead to be soldered to IC72 (if sideways RAM is to be used).

Power supply leads to the main board are reconnected to the HCR Board. A pair of power leads from the expansion board connect to the vacated power tags on the Beeb, which allows the board to take its power directly from the host micro, getting round the need to pick up the power from the header socket. This eliminates possible crashes that may occur when trying to draw up to 650mA from a sideways ROM socket. HCR has provided a high-quality, header plug for connection, and three mounting pillars and adhesive pads. Both the soldering and the removal of the Beeb's power leads are beyond the scope of beginners.

The HCR board proved reliable, very stable, and ROMs are easily inserted or removed. My only gripe with this otherwise excellent board is the installation procedure and the fact that it lies over the Beeb's hot RAM area. Although this did not seem to bother my computer, it may prove a problem with older versions. An Aries B-20 would not fit with the HCR in place. The HCR Board represents value for money for the hobbyist who is confident with a soldering iron.

Computer Village CVx16-2

Based on the Mk1 CVx16, this new version offers some improvements over its predecessor. The quality and construction of the CVx16-2's double-sided PCB is excellent. It features 18 buffering and decoding chips, and can handle up to 16 ROMs and 16k of paged RAM. The Mk1 board could only handle 2k (6116) RAMs, but the new model now permits the use of 2 × 8k (6264) devices. This board is so versatile that no less than nine configurations are possible. The elements from which the various combinations can be made are: 16 paged ROMs; Software switching between ROMs 8 and 9; 16k RAM as 8 × 2k devices *or* 16k RAM as 2 × 8k devices; Software switching between ROM 9 and 6116 RAM *or* Software switching between ROM 9 and 6264 RAM.



Computer Village CVx16-2

Battery backup for the RAM is provided as standard. The primary lithium cell on board can be exchanged for a rechargeable NICad cell at the time of purchase – as fitted, the battery has a life of about five years.

Installation comprises the removal of both the 6502 CPU and ULA (IC6) chip and fitting them in the corresponding sockets on the CVx16-2 board. Trying to align the very fine, turned-pin legs of the board into the two sockets proved quite difficult – the pins bend easily and are too fragile for the task. A pair of power leads on the BBC board must

WHAT THEY OFFER

Board	ATPL	WATFORD Mk2	HCR 16	CVx16-2	ROM BOX	RAM/ROM BOX
RAM or ROM	RAM/ROM	RAM/ROM	RAM/ROM	RAM/ROM (nine configurations)	ROM	RAM/ROM board inc. own PSU
ROM sockets available	12 OR 11 + 1 RAM position (Plus 4 on BBC board)	13 + 3 on BBC board 2716 and 2732 EPROMs may be used	12 + 4 on BBC board	16 (8 sockets can carry 2716 EPROMs)	8 (1 is a ZIF socket)	12 + 4 in BBC. Optional 2nd board enables possible 28 resident ROMs
RAM available	16k as 2 × 8k CMOS (6264) static RAMs. Battery backup option	16k as 2 × 8k CMOS (6264) static RAMs. Battery backup option. (Also 6116 RAM chips)	16k as 2 × 8k CMOS (6264) static RAMs. (Also 6116 RAMs)	16 possible CMOS (6264) static RAMs. (Also 6116 RAMs). Battery backup as standard	n/a	16k possible as 2 × 8k CMOS (6264) static RAMs. Also 6116 RAM chips may be used. 2nd board provides another possible 16k
Installation	Plug in (internal)	Plug in + 5 wires to solder (internal)	Plug in + 6 wires to solder (internal)	Plug in (internal)	Plug in	Plug in
Price	£44.85	£38	£36.80	£52.24	£57.44	£86.25 £32.20 for second card. £27 for additional driver board
Available from	ATPL, Station Road, Clowne, Chesterfield S43 4AB	Watford Electronics, Cardiff Road, Watford, Herts	HCR Electronic Services, The Industrial Unit, Parker Road, Chelmsford, Essex CM2 6ES	Computer Village, 2/3 Hazledine House, Central Square, Telford, Shropshire TF3 4JL	Northern Computers, Churchfield Road, Frodsham, Cheshire WA6 6RD	HCR Electronic Services, The Industrial Unit, Parker Road, Chelmsford, Essex CM2 6ES

either carefully be removed and refitted or bent flat. All that remains is to socket the 'permanent' ROMs (Basic, etc) on the board.

The CVx16-2 proved reliable despite being located over the Beeb's RAM area. An Aries B-20 RAM board can be piggy-backed on the CVx16-2. Switching between sockets 8 and 9 allows, eg, two conflicting DFSs to reside happily. There are two modifications I would like to see – the board cries out for a pair of supporting pillars, and the 12 links are packed too tightly. Despite these gripes I recommend this board for anyone developing sideways firmware. Used in combination with Computer Village's *ROM Master* ROM (£19.95) the CVx16-2 is an indispensable tool for firmware development.

External boards

I have always been in favour of external ROM boards as you don't need to remove the Beeb's lid every time a ROM is changed, and they make room available for other expansion options. The advantage for schools, etc, is that valuable ROM firmware can be moved from computer to computer.

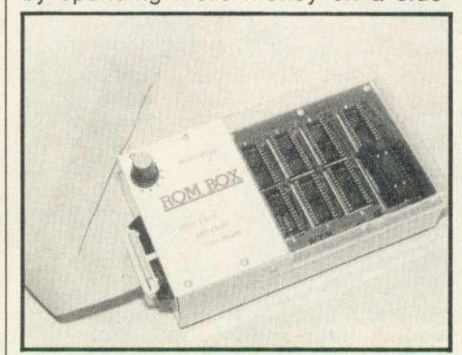
Micro Pulse ROM Box

The ROM Box from Micro Pulse is a beautifully designed and manufactured peripheral which enables you to access up to 11 ROMs. However, not all the eight resident ROMs can be on-line at once – there is a switch enabling only one to be selected at a time.

The ROM Box connects to the BBC micro by a 28-way ribbon cable and an easily detachable edge connector. The 28 DIL header to the cable simply plugs into one of the empty sideways ROM sockets between the OS 1.2 and the Basic chips, then the short (290mm) cable is clamped when the computer's lid is replaced.

The unit works very well. I particularly like the inclusion of a high quality ZIF socket (position number 5 in the box), allowing easy and safe changing of ROMs. Another thoughtful feature is the red LEDs to indicate the current ROM. The fact that ROMs are isolated means ROM interaction problems associated with internal boards are avoided. It's possible to use the ROM Box with an internal board thus allowing a total of 23 resident ROMs, and it will work with almost any other expansion option.

Two disappointments in this otherwise excellent unit are the lack of on-board sideways RAM and the price. The former problem can be overcome by spending more money on a sideways RAM card, but the solution to the latter is in the hands of Micro Pulse.



Micro Pulse ROM Box

HCR External RAM/ROM

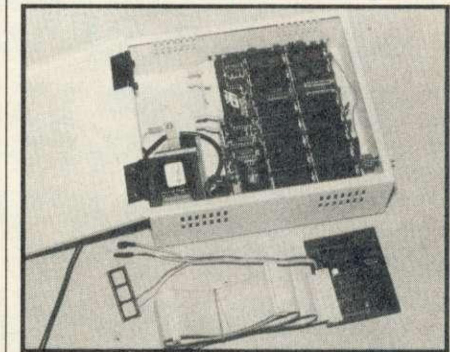
To overcome problems of power drain on the host Beeb, HCR Electronics has marketed an externally powered expansion system. It comprises two units – an adaptor card that plugs into socket 4 in the BBC micro and contains all the necessary buffering and control logic to interface with the external unit. An external card housed in a 215 × 195 × 65mm steel case contains 12 sockets for ROM/RAM combinations. The connection to the external box is via a 700mm 34-way cable. All connnections to the micro are plug-in.

The 12 ROMs of the external board can be added to the four in the BBC micro (the internal card has a piggy-back socket). The board may also have CMOS RAM fitted as extra (6116 or 6264 devices). Up to two pairs of sockets are available which configure a pair of 8k ROMs to simulate a 16k ROM. The external box has been designed to allow a second 12-socket board which is selected by a POKE.

This configuration brings the possible number of ROMs available up to 28 (or 24 with 32k of sideways RAM). A write disable switch is included as standard and will operate on RAM fitted to either or both boards.

Installing the system is easy thanks to good design. High quality components help ensure that the operation is smooth and simple. The various configurations are set by 13 link jumpers. Both boards sit very firmly on their pillar-supports and are easily removed when ROMs are to be changed.

For an expansion unit that gives you just about everything except RAM battery back-up, this unit is top of its class. With the HCR unit just about any other expansion option is available to you.



HCR External RAM/ROM System

Conclusion

All the boards have certain strengths which will appeal to people with particular needs. To simply increase ROM capacity the ATPL Sidewise board is a good solution. For the hobbyist who is handy with a soldering iron the HCR 16 board offers similar facilities at a competitive price – it certainly scores over the Watford board. If you wish to develop firmware the CVx16-2 provides a flexible range of facilities.

The two external units are rather different. The ROM Box is expensive for what it offers but does provide a neat method of expanding one ROM socket. The HCR unit is really for the buffs of ROM/RAM expansion – if battery back-up was available this would be the most versatile and comprehensive system on the market. As it stands, it certainly provides an elegant means of expanding your Beeb's sideways ROM and RAM potential.

HOW THEY SCORE

Expansion board	ATPL Sidewise	Watford Mk2	HCR 16	CVx16-2	ROM Box	HCR External System
Design	4	2	3	3	5	5
Construction	4	2	3	5	5	5
Ease of installation	3	2	2	3	5	5
Ease of ROM removal/insertion	3	3	3	3	5	3
Versatility	3	3	3	5	3	5
Documentation	4	3	3	4	3	3
Value for money	4	3	3	4	2	3
Total (35)	25	18	20	27	28	29

Key: 5 *Excellent* 4 *Good* 3 *Satisfactory* 2 *Poor* 1 *Very bad*

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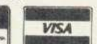
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ON THE BALL

Roll up for Ian Hall's review of Marconi's RB2 Tracker Ball


'Gives two dimensional manipulation which provides both fast movement and good fine control'

Marconi RB2 Tracker Ball £59

IF you're fed up with wearing out your two typing fingers and are thinking about buying a device such as a mouse, then you might well consider the Marconi RB2 Tracker Ball.

The tracker ball was developed for military and industrial use and can give two dimensional manipulation which provides both fast movement and good fine control. This compares well with a joystick which can give the former but is not so hot on the latter. The way a tracker ball gives you both is by automatically providing good finger-tip control but it can be treated 'violently' and spun rapidly to move quickly. It consists of a free-moving ball, which when rotated horizontally and vertically can give the same control as a joystick. The inherent mass of the actual tracker ball assists in the fast movement – it can 'free wheel'.

It measures approximately 200mm by 110mm, is no taller than your Beeb, and does not look out of place beside it. The 'ball' part is about two-thirds the way up the face of the device, which is sloped so that the palm of your hand sits comfortably on the top and your fingers can easily manipulate the ball. Just above the ball are three buttons that can be put to various uses.

It plugs into the user port and, for the technically minded, relies on the use of the two interrupt lines. Marconi provides various pieces of software that allow you to use the Tracker Ball in different ways, plus a drawing/artist program – but more on that later.

On unpacking, the Tracker Ball gives the impression of a robust device, and a sneaky peek inside the unit shows a high standard of construction. The ball sits on two metal shafts at right angles to each other, and on the end of each is a small slotted disc, two optical pickoffs detect rotation of the discs and a small amount of electronics get the information in a form suitable for the Beeb.

I find the Tracker Ball a lot easier to use than a mouse. You can get finer control without much arm movement. A big plus is that you don't need a clear flat area next to your Beeb. Its disadvantage is that you can't press the buttons and move the control with the same hand, but you should be able to overcome this if the software allows for it (Marconi please note).

The main software package consists of three utilities and a drawing program called *Paintball* on a cassette, plus a program to transfer them to disc.

Two utilities allow you to use the tracker ball in place of joysticks or cursor keys. The tracker ball and push buttons can be set up to emulate nearly any key on the keyboard. The third utility allows it to be used in your own programs, but the documentation on this facility was somewhat lacking. These utilities take up one page of memory – its location can be user-defined. This highlights what I consider to be the major limitation of the system – I would prefer the software to be resident in PROM, as with the AMX Mouse, and provide dedicated utilities.

The manual says you can use the utilities with a large amount of existing software but there is some trial and error involved in locating the utility so that it doesn't clash. However, there was no problem in getting it running with *Wordwise* or *View* and it proved quite useful in scanning documents.

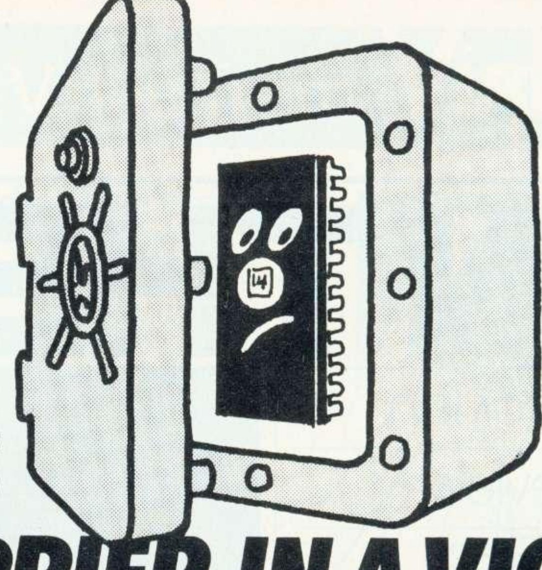
The *Paintball* program is a drawing program in four colour mode 1 that is menu driven with the use of the Tracker Ball. It provides the normal drawing functions such as circles, rubber lines, free-hand drawing, etc, and has an excellent fill routine. However, it only fills in solid colours and does not provide 'shading' which the AMX Mouse package does. A nice feature of the program is that it is written in Basic and a User function is provided on the menu. This calls any user-written procedure within the program and can be used for dedicated printer dump routines. On the not-so-good side, a major omission is that it does not ask you the familiar 'Are you sure?' when you select Clear Display, and so a slip of the finger could have you weeping over the keyboard. Also, the text facility is rather limited.

In addition to the cassette software, you also get an artists drawing program on disc. I'm afraid I cannot enthuse about this package which is about as user-friendly as an upside-down VDU (for example, you have to reply to five questions to draw a circle). The program doesn't use the Tracker Ball to its full potential and relies heavily on the keyboard.

To sum up, I consider the Marconi RB2 Tracker Ball a useful addition as it provides more control over the cursor than a mouse. Its major limitation is the lack of a utilities PROM such as the AMX system but there again, at £59 it's just a wee bit cheaper. Since it can successfully be used with user-friendly icon- and menu-based software I would hope that specialised software will appear soon.



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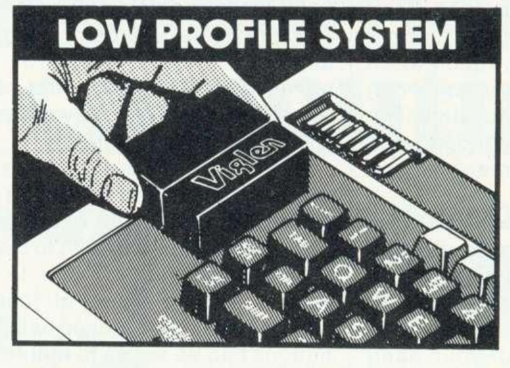
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All the business

'Micros in Business: an introduction to business software for the BBC Microcomputer', Acornsoft, BBC B with 1.2 OS and disc drive, £59.80 inc VAT (40/80 track)

IT'S important to realise that this is a demonstration and training package intended to display the range and quality of business functions which can be performed on the BBC micro using software produced by Acornsoft. It consists of three discs containing five programs, a good manual for each with key strips and a general guide.

The personnel program demonstrates typical documentation used for recruitment, promotion, manpower projections and a holiday chart with generous and convincing files which can be altered in many ways. After testing it, I am sure that a full system with print facilities would meet the needs of a fair sized business.

The spreadsheet program is a greatly simplified version of the excellent *Viewsheet* which demonstrates a small but impressive part of the range it can offer. The examples are taken from the books of a small building firm, and show various wages records, job control and cash flow forecasting. Again there are opportunities for inserting data, and all the information can be printed easily. The screen format is limited to mode 7 but that hardly matters for a demonstration.

On the same disc the Wordprocessor program similarly demonstrates the *View* wordprocessor from the same publisher, and hardly does justice to this excellent standby. It shows all the main features of construction and editing with output to printer, plus letter writing, report writing and a mailshot.



Make your choice from the menu

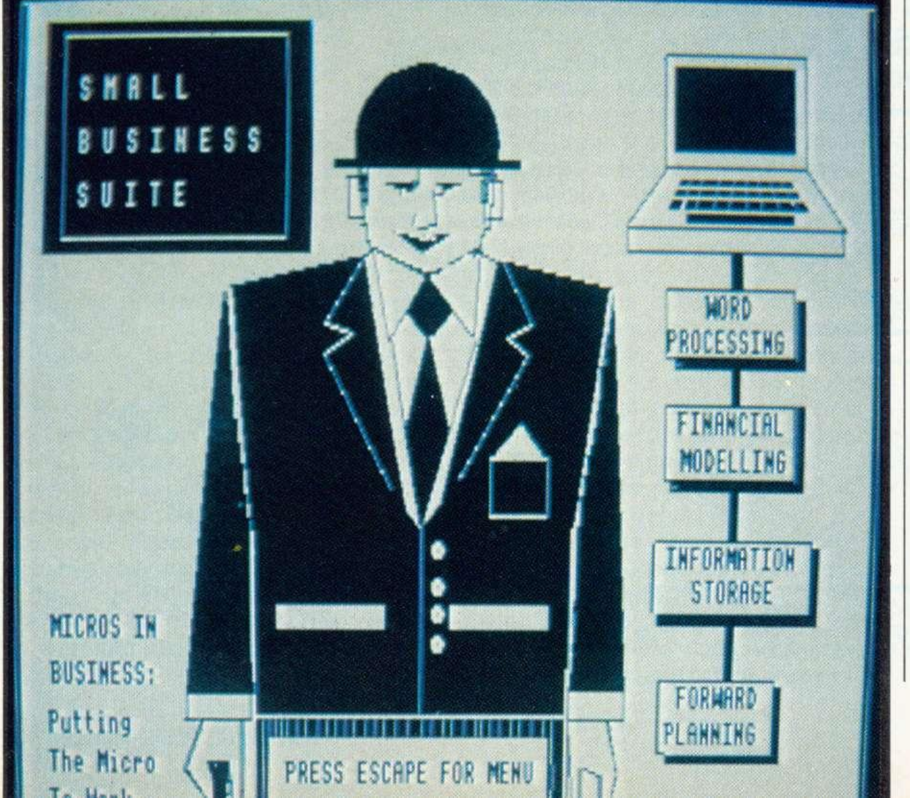
The Database program is a good sample of what can be done, and looks much more professional than the dated one I habitually use. Using the same building firm for illustrations it shows a supplier's address list and records of equipment hire and work in progress.

Finally, Planner is part of Acornsoft's *Desk Diary* package which I had not seen before, and it illustrates how to maintain an appointments diary, record forward plans and set an alarm to remind you to keep to them!

As the guide says, '*Micros in Business* is designed with training in mind and is not intended for business purposes', but it also serves as an excellent introduction to Acornsoft's range of products and an invitation to buy them.

Roger Carus

Micros in business: 'an excellent introduction to Acornsoft's range of products'



Limited compilation

'Basic Compiler' Simon Parker, ACK Data, 21 Salcombe Drive, Redhill, Nottingham NG5 8JF. Tel: (0602) 262498. £26.95 (£28.95 disc)

THIS is yet another attempt at a Basic compiler for the BBC micro. The utility is supplied on disc in the form of two programs, CBASIC and CBASCOM, and is designed to convert a Basic program into machine code. Because a machine code program can run several times faster than an uncompiled Basic program there is certainly a place and need for such compilers – provided they can be made to work satisfactorily, and the trouble is that they often don't.

A fundamental difficulty stems from the versatility of BBC Basic, as it offers a large number of non-standard command keywords, and the translation of the whole range of available keywords poses insuperable problems for the designer of a compiler program. Simon Parker's compiler claims to support the translation of approximately half the keywords available in BBC Basic, and so, at first sight, appears an improvement on the earlier compilers.

However, there are many hidden limitations that go beyond the restrictions of keywords alone. For instance, arrays are not allowed, neither are string variables, nested for-next loops, nor floating point variables. I use about two dozen Basic programs frequently on my micro, and my attempts at compilation led to only one successfully compiled object code, and this was for the most trivial of my programs.

Altogether I was thoroughly disappointed, and most of my attempts to use this program ended on the rocks with the annoying message 'Basic Compiler Aborted'.

In general, to get an object code from this package it's necessary to perform a considerable amount of program modification even for comparatively simple Basic programs. As for more complex programs which necessarily involve arrays, and/or more than 26 variables, and/or an excessive number of program steps (over 300) there is no hope of a compilation.

The compiler works successfully only for programs that are either very simple or highly contrived, so its usefulness is rather limited. The ideal Basic compiler for the Beeb is still to be written. Perhaps Computer Concepts will come to the rescue, and I await the final announcement of their promised product with eager anticipation.

Chandra Wickramasinghe



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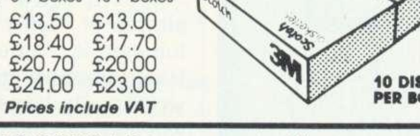
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ON THE DOUBLE

Are Solidisk's low-cost double-density disc filing systems too good to be true? asks Chris Drage

Solidisk DDFS with 2.0 DFS £48.95
Solidisk DFDC with 2.0 DFS £54.95

SOLIDISK Technology (of sideways RAM board fame), retails two double-density disc filing systems (DDFS) at prices which make even a confirmed sceptic sit up. As most current DDFSs cost over the £100 mark, is the Solidisk offer too good to be true?

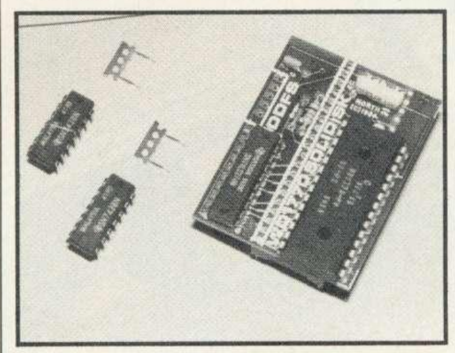
The smaller of the two boards is purely a DDFS based on the Western Digital 1770 chip (also found in the BBC B+). The second board, DFDC (dual floppy disc controllers), enables users to switch between the Acorn (single-density), 8271 and the WD1770. The DFDC system is designed for people who may wish to upgrade their Acorn DFS to take advantage of the double-density mode. The house-keeping routines of both systems are controlled by the Solidisk DFS 2.0. Existing users who have an earlier version of this DFS (1.4 to 1.8), should upgrade their firmware, as Solidisk claims the 2.0 has all reported bugs corrected.

Installing the DDFS board entails plugging in two buffer ICs, two jumpers, the controller board and the EPROM. The DFDC differs slightly in that the two jumpers are replaced by a pair of flying leads which must be either soldered or 'pushed' into the socketed legs of IC 86 and 87. It also has a switch to facilitate the selection of each controller chip, and this can be mounted in the Beeb's Econet 'hole'.

The installation of the boards lets down an otherwise excellent system. Cheap components and bare single-strand leads can result in problems for the inexperienced. If Solidisk provided header sockets for the leads on the DFDC board it would be doing everyone a favour including itself! The jumpers on the DDFS board can also cause problems – I recommend anyone interested in this system to purchase a pair of turned pin sockets to avoid the risk of damaging the Beeb's sockets. Solidisk does employ a number of 'local experts' around the country who will install their system free of charge and give advice on any problems.

Once up and running each system performs as it should. The double density feature allows 16 sectors per track (as opposed to Acorn's 10). This 60 per cent improvement in storage translates to 160k and 320k for 40 and 80 track discs respectively. If you are using long data files this is a substantial improvement.

The new 2.0 software is certainly speedy. It defaults to a fast disc access time (6ms STEP, 0ms SETTLE), and is tube compatible. A marked improvement in time occurred when I verified discs and tried '*BACKUP'. Overall, the Solidisk DFS worked about a third faster than normal. As well as improving the speed of the WD1770 FDC, the 2.0 DFS can be purchased separately to improve the performance of the Acorn DFS system. Acorn DFS users simply replace their DNFS ROM with the new Solidisk one.



DDFS: worth considering

Perhaps the most welcome feature of the Solidisk 2.0 DFS is the unlimited number of filenames. When the number of files on the current catalogue reaches 31, a new catalogue is created automatically. There is also automatic density and drive-size selection upon catalogue, and the process is transparent to the user.

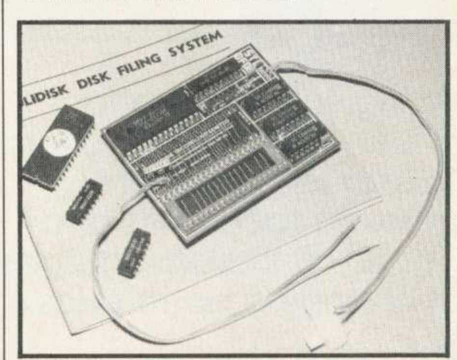
All the usual DFS commands are there plus a number of useful additions (figure 1). It's good to see a disc formatter/verifier DZAP and MZAP included as standard, and it's a real bonus to have a tape-to-disc copier thrown in! '*SPEED' is included to enable the speed of access, etc, to be altered if you have older, slower drives.

Another plus point is the WRITE-check feature. The Solidisk DFS does a read check every time a file is being saved, ensuring no errors are present on the disc – useful if you've had problems saving long text files transmitted down the telephone line, for example.

One inexplicable, annoying problem with the review version was that on power-up, drive one would start whirring round even without a disc present. I thought the Acorn DFS was coming back to haunt me! Another grumble concerns the documentation – I wish Solidisk would sort out its manuals once and for all. The manual I received didn't even refer to the DFDC board! I learnt later there is a separate sheet for the DFS 2.0 which includes the installation of the DFDC.

Conclusions

A number of the double density systems on the market are not fully compatible – they do not read some protected discs. The Solidisk system scores very well here – it managed to run *Magic Mushrooms*, *Cocktail Maker* and *Revs* in WD1770 mode!



DFDC: particularly reliable

This is one of the most versatile systems around and at a price even humble *Acorn User* authors can afford. The DFDC board has proven to be particularly reliable.

I cannot recommend either system for the inexperienced, however, as there is a risk of unreliability or damage to the Beeb's sockets due to the unprofessional, installation procedures. For those prepared to take the plunge, Solidisk's DDFS system is definitely worth considering if you're after more space on your discs or the Acorn DFS is too pricey for you. With the DFDC board, 100 per cent compatibility is available at the flick of a switch, which could be an important consideration for Acorn DFS users. Overall, I'd recommend it to the enthusiast/hobbiest.

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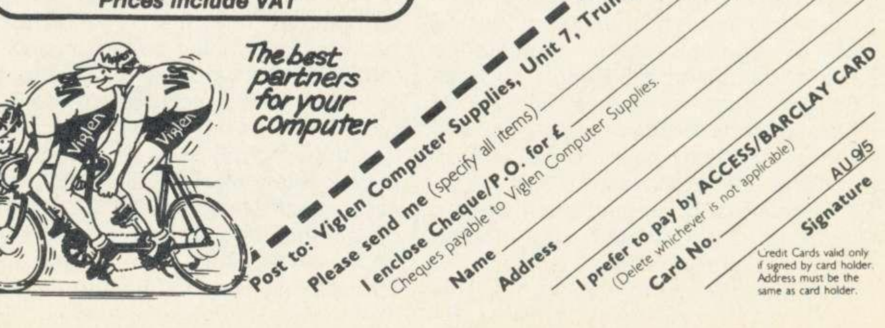
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Slow, slow, quick, quick, slow

YOUR replies to my plea for benchmarks in printers not covered in the articles in June 1984 and February 1985 have been rewarded by a large number of replies flooding in to the office.

You'll find the program used to obtain the benchmarks in the 'Running instructions' panel, and I'd still welcome your replies on printers not in the list. The instructions for sending data are in the 'Send in' panel.

The aim is to produce realistic figures for printer speed, in characters per second, over a standard print run. This run is not a full simulation of a real situation, and a number of readers, while agreeing with the principles of the test, have made minor criticisms. Mr Hutchon of Darlington, and many others, feels that the tests are not entirely fair to daisywheel printers, as the characters chosen are too far apart on the wheel, and so involve a lot of slow wheel spinning. This is indeed true, and the benchmarks are perhaps slightly over-critical of daisywheel printer performance in general. For complete fairness we should have printed a fully-punctuated piece of English prose, but I doubt whether readers would have replied in such numbers if the program had been one to do this!

Another valid point is that linefeeds and carriage returns actually count as printing characters, so we should be dividing by 2025 not 2000 when we calculate the speed. However, I doubt whether buyers of printers realise the distinction between printing and non-printing characters when buying, and I don't feel very guilty about the slight inaccuracy!

My favourite reply concerned the Taxan Kaga. This was the most popular printer in the last set of replies, and clearly well thought of by all owners. It is a dot matrix printer with NLQ (near letter quality) style available. The reply was beautifully printed – using a daisy wheel!

George Hill

Manufacturer	Model	Type	Speed in cps Claimed	BM
Aut	100beta	DM	100	83
Brother	M1009	DM	50	28
	HR5	Th	30	20.4
	EP44	Th	16	11.6
	CE50,51,60	DW	13	7.9
	HR15	DW	13	8.8
	EP22	DM	17	10.5
BMC	BX80	DM	80	58
Canon	PW1080A	DM	160(27)	0(25.7)
	PJ1080A	IJ	37	30.5
Centronics	1504	DM	150	100
	739	DM	100	45
Copal	SC1200	DM	120	79(19.4)
Cosmos	80	DM	80	6
CTI	CPA80	DM	80	65
Datac	DX109V	DM	80	54
Epson	RX80	DM	100	65(12.5)
	MX80/100	DM	100	64
	FX80	DM	160	92.2
IDS	Microprism	DM	110(75)	85(61)
Inforunner	Riteman	DM	120	78
ITT	3351	DM	80	57.3
Juki	6100	DW	18	11.3
Mann-Tally	MT80	DM	80	50.2
NEC	PC8023BE-C	DM	100	63.5
	PC8023DE-N	DM	120	74
OKI Microline	80	DM	80	35.1
Olivetti	JP101	IJ	66.7	62.5
Olympia	EC2	TW	11	7.8
Panasonic	KXP1091	DM	120(22)	78(16)
Quendata	DMP81	DM	80	55
	DWP1120	DW	18	10.4
Qume	Sprint9/45	DW	45	29.7
Ricoh	1200DL	DW	20	14.5
	RP1600	DW	60	34.4
Sanple	D-S2000	DW	18	10.5
Seikosha	GP100	DM	50	32.5
	GP250X	DM	48	35.6
	GP700A	DM	50	25.3
Shinwa	CP80	DM	80	55
Silver-Reed	EXP200	DW	14	10.5
Smith-Corona	D-200	DM	160	111
	TP-I	DW	12	9
	EL2000	DW	—	8.7
Star	DP510/515	DM	100	72.6
	DP8480	DM	80	43.5
	Gemini 10X	DM	120	75.5
	Delta 10	DM	160	96.7
	STX80	Th	60	31.3
Tandy	DMP100	DM	50	35
	CGP115	PL	12	7.6
Taxan	KP-810	DM	140(27)	95.2(22.8)
Walters	WM2000	DM	120	107

Key
DM = dot matrix, DW = daisy-wheel, IJ = ink jet,
PL = plotter, Th = thermal.
Figures in brackets are for near letter quality options.

How the most popular printers fared in your benchmark tests

RUNNING INSTRUCTIONS

```
 10 REM Printer Benchmark
 20 REM Time taken to print 25 rows of 80 characters
 30 VDU2,1,7,1,13
 40 FOR I=1 TO 25
 50 FOR J=1 TO 40
 60 VDU1;42,1,120
 70 NEXT
 80 VDU1,13
 90 NEXT
100 VDU1,7,1,13,3
```

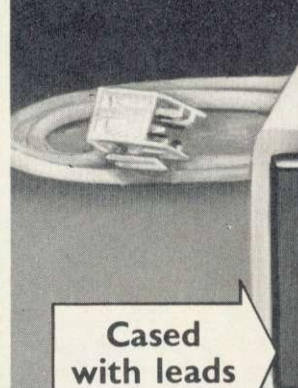
1. Run the program, starting the stopwatch on the first beep from the printer, or on the printing of the first *.
2. Stop the stopwatch when the second beep is heard from the printer, or when the final x is printed.
3. Record the time taken.
4. Calculate the speed by the formula: speed = 2000/time.

SEND IN

1. Your name and address.
2. The maker's name, model number of the printer and price.
3. Type of printer (dot-matrix, daisy-wheel etc).
4. Manufacturer's quoted speed from the manual or advertising.
5. The print out produced by running the program.
6. The time taken, and your calculated speed in cps.

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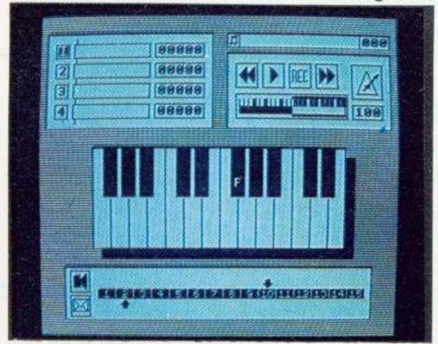
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SOUNDING OUT THE SYSTEM

Christopher Cross of pop group Ultravox and Peter Wood make music with Island Logic's disc

'Music System', Island Logic, BBC B, £29.95

THIS system is a joy to use. After opening the case one step leads to another and, for a change, you get an instruction booklet that's well designed,



Keyboard: music notepad and recorder

attractive and informative. Simplicity itself I hear you say, but there are a few drawbacks with such simplicity. You are reliant on the BBC micro's sound generation chip and the awful speaker (from second-hand National Health hearing aids?). However, Island Logic has rectified this to a certain extent by describing some simple modifications to the main PCB which you can do yourself. One gives you a speaker output, which just amplifies the racket that the BBC micro speaker produces, and another is an audio out which means you can plug it into your hi-fi or stereo.

The best news, however, is that Island Logic is planning a MIDI (musical instrument digital interface) output. This is a music system developed for most modern keyboards, music composers, etc, and would mean that you could control better sounding keyboards, drum machines, and the like.

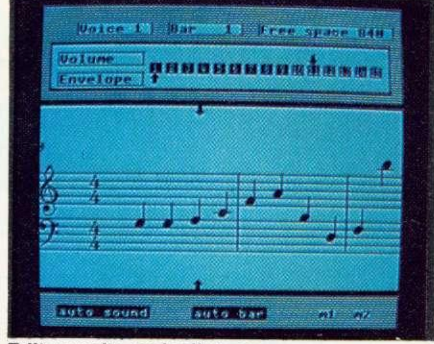
The main menu offers five pages – the editor, the keyboard, the synth, the printer and the linker. The editor is for writing or editing tunes. The keyboard is virtually a music notepad and a four-track recorder. The synth is a basic one and it allows you to set up volumes, envelopes, etc. The printer gives you various types of hard copy. The linker is the interesting part because it allows you to join together short sections of music to form a longer piece.

In use

Island Logic has come up with a program that's almost uncrashable and simple to use – in fact it's basically idiot-proof. Once you enter the edit section, a double stave is displayed on the screen and your initial note is shown as a crochet, simply changed by the keys q and w. Pitch is controlled by the cursor keys – up raises the pitch and down lowers it. It couldn't be simpler, I hear you cry – well, it couldn't, but it does become tedious eventually. A rest is entered by tapping the space bar, which converts the note length displayed into silence. Then you run back to the beginning of the editing section, press play, and off you go.

This is the first program we've seen that's designed for ease of use, and more importantly, it's also simple to use visually. The graphics are superb, and aid understanding of the program.

On the synth page you can, to a certain extent, create your own sounds, and build up a library of sounds, envelopes, etc, and store all this to disc



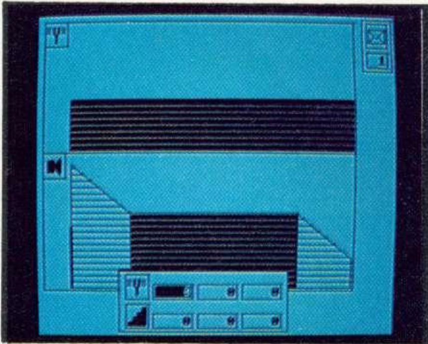
Editor: write and edit tunes

at any stage. The graphics are of great help here, especially the copy key which updates the visual display of sound at any point. They also show what the various parameters do, so you can make all the necessary adjustments to the sound.

Unfortunately, we didn't have a printer connected so we couldn't test the hard copy functions. According to the manual, single or multi-voice scores can be printed out – this might be useful for schools. Island Logic says this system will run on all Epson RX80, FX80 or Star Delta 10-type printers.

Conclusion

Island Logic has come up with an extremely good program, offering excellent value-for-money. However, a few careful consultations at the design stage with electro-popsters would have made this package more flexible. We found that operating the program was

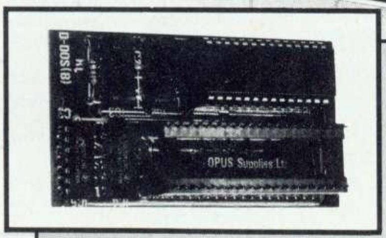

Synth: create your own sounds

so much fun initially it could rival some games. In time, of course, this eventually wears off, and at that stage you would want to go on to bigger and better hardware and software, which would cost at least 10 times as much.

Overall, this is an ideal package for someone who wants to compose on the Beeb. We feel it is a useful teaching aid, and loved messing around with the demo songs. It would also be a good package for handicapped people who can't physically play an instrument – they could sit down and program a micro to play a tune.

So, we have a cheap and cheerful music composer that works very well within its limitations.





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• SUNDAY TIMES
business news



Reuters in $2 talks

by Harvey Laundry, City Editor

REUTERS, the international news agency and business information group, is negotiating to buy 17 sets of screws for its new Acorn communications terminal. It has long been suspected that it would be a big terminal.

Acorn business division marketing director Mike Tweedledee said from Cherry Hinton yesterday: "This deal proves that our recent diversification is paying big dividends. No other computer company has ever sold screws to Reuters before."

It is thought that Acorn is entering the screws market just as the bottom is about to fall out of it, *writes Jane Thrush*. Tweedledee must be dumb – and who is Acorn to talk about paying big dividends? Meanwhile yet another air of gloom and doom is just over the horizon.

QLs for low-tech

ROBERT MAXWELL's dispute with the print unions over new technology has been settled. Daily Mirror proprietors Purgatory Press got around the problem by using QLs. Meanwhile Sir Clive is reported to have run off with a cartoon cut-out called Jane.



Memo to Maggie

REF: Corporate image

PROBLEM: Acorn's corporate image, bolstered for so long by promises of undesigned products, has recently been dented by undesigned press reports of "difficulties".

ANALYSIS: Unscrupulous journalists became too lazy to play the game and visit Acorn R&D in Cambridge to get the latest leaks. A handful of amateur hacks invented a story about Acorn almost going bankrupt and being taken over by Mafia offshoot, the "Bennett-teddy boys".

ACTION: Nip this gossip in the bud. Reveal the truth about the Christmas Electron boom. Admit to record profits in the end of year accounts. Prove that the Bennett-teddies are actually a bunch of Cambridge megalomaniac computer science graduates. Invent some juicy leaks. Appoint a new, Long-overdue MD.

Sinclair gets new lifeline



by Watchda Birdie, computer correspondent

MIRROR publisher Mr Robert Maxwell last night mounted a dramatic £12 million rescue bid for Sir Clive Sinclair's home computer company. However, the fact that his arch rival Rupert Murdoch has not leapt in to save Acorn must mean something bad.

Maxwell said: "The deal will easily pay for itself, because I'll be able to save a fortune on storylines for the Jane cartoon. This paper's motto is 'Forward with Britain', and we will show Sir Clive – a man of brilliant inventive genius – being forward.

"We will not be changing the paper's motto to 'Quantum Leap forward with Britain', but might sponsor Sir Clive – a man of brilliant inventive genius – for the next Olympics."

The happy couple are now to embark as a duo on a singing career with an Elton John number *Captain Fantastic and the Browned-off Cam Boy*. Maxwell and John are now discussing whether Oxford or Watford will provide the chorus. Arsenal's bid has been squashed after their appalling showing on *Database*, where they failed to kick the ambient Tony Bastable off the pitch.

Another Atom collapse to come

by Jane Rook and Jean Bird O'Doom

ARGENTINA has clinched agreement with its main suppliers to extend its credit limits and issue new shares in an attempt to stave off the effects of the Easter slump in sales of the Malvinas State Exaggeration computer (MSX).

Although Acorn is trying to sell millions of computers to Brazil – which brings in the tenuous link that the two countries are in the same continent – Bird watchers say the collapse of Acorn has nothing to do with Argentina.

There is no chance of Italy buying 49 per cent of South America.

INSIDE

FOCUS:

Sicilian Times

THE SUNDAY TIMES is overwhelmingly the favourite paper amongst unemployed sand sculptors in Dorking. A research survey carried out by Molly showed that two out of three of those asked preferred reading Jane Bird's essays to jogging on the common. Molly's other friend has recently started going to alternative feminist classes.

This demonstrates the value of the policy of the Sunday Times editorial board in printing submissions from only the best fiction writers. Jane Parrott's anthology of short stories, a Sunday Times exclusive, is short-listed for a Rooker prize.

The Absurd Unofficial Acorn Abuser Exhibition



THIS year's Acorn Boozer Show looks set to break all floppy discs at the Baked Bean Can Centre in the City. Over 40,000 people are expected to pass out. Acorn will be using the show to resell itself to the public. (Or anyone with a handful of lira.) *Elite 3* with special 3D Judderama will be demonstrated on Clive's flat-screen TV and you can try your hand at *Reps*, a realistic simulation of the selling of a BBC micro. Anyone completing the first lap in under two days will be offered a job.

Acorn Abuser will be there in farce with a baffled author's clinic. Our undercover sleuth will be there – you could meet him. But the mystery of the show is guaranteed. Just who is Orson Fact?

Sun sets on the IT sunrise



COMMENT

Jane Eggbox

THE RECENT crash-landings of many of the high flying state-of-the-art information technology sunrise companies (HIFSITS) has embarrassed the government at a time when silly acronyms are hard to come by.

Spokesman Bob Croakes of Tadpole Technology, a recently spawned company in the murky waters of Milton Road Science Pond, said: "The toads are just hopping off".

Meanwhile Martin Fleaboddy, ex-founder of most of the bankrupt Cambridge companies was said to have retired to South America, co-incidentally on the day that Deloitte, Haskins and Young failed to sell Data Torchnology to JMB, with backing from the Bank of England.

With industry observers confused over most points only one thing was clear. From little tadpoles do mighty frogs grow.

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THE MAP (SCREEN H)

SCREEN L

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